(2)

INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT

232nd Combat Communications Squadron

Montgomery Air National Guard Station
Alabama Air National Guard
Montgomery, Alabama

February 1991

HAZWRAP SUPPORT CONTRACTOR OFFICE
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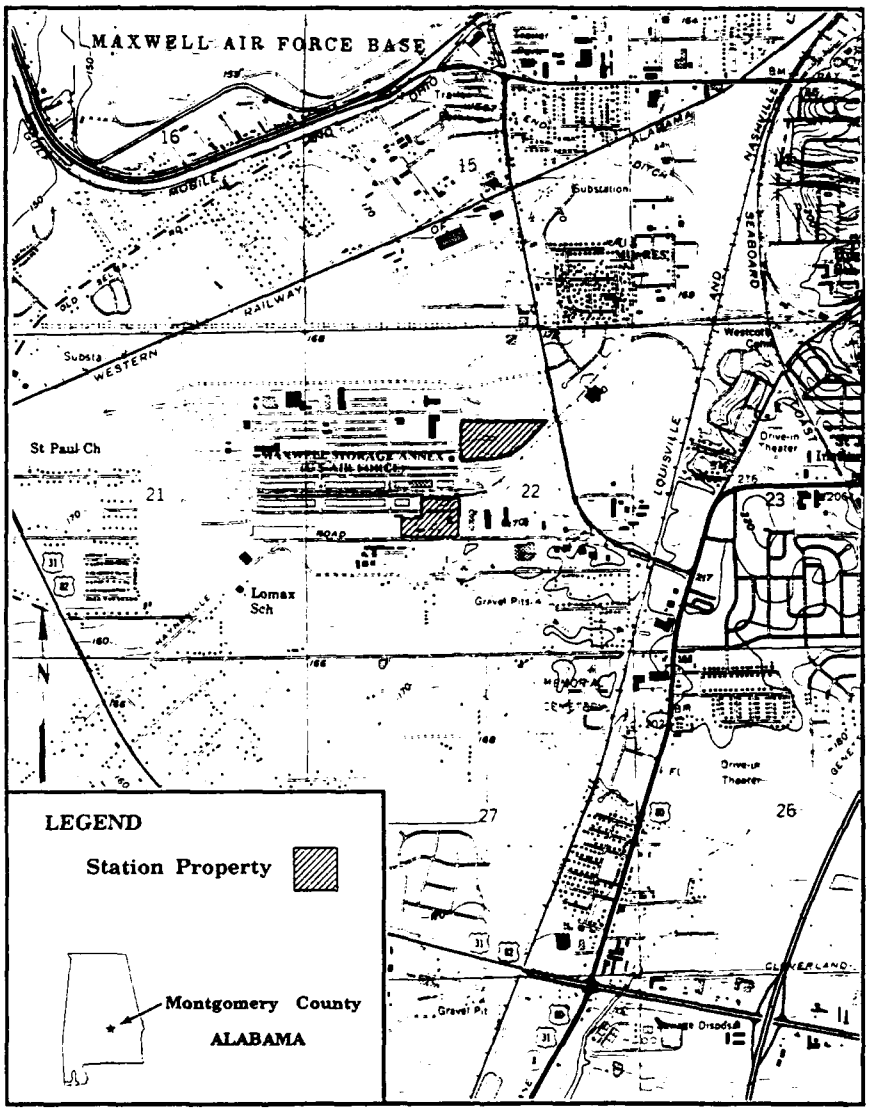

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	February 1991	Preliminary Assessment

4. TITLE AND SUBTITLE Preliminary Assessment
232nd Combat Communications Squadron
Montgomery Air National Guard Station
Motgomery, Alabama

5. FUNDING NUMBERS

6. AUTHOR(S)
N/A

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
Science and Technology, Inc.
704 South Illinois Ave.
Oakridge, TN 37830

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Hazardous Waste Remedial Actions Program
Oakridge, TN

Air National Guard Bureau
Andrews AFB, Maryland 20331

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*
Preliminary environmental assessment for the Montgomery Air National Guard Station, as part of the Installation Restoration Program. The report reflects data gathered from records review, interviews, and a site visit. Two sites were identified as potentially contaminated and recommended for further investigation.

14. SUBJECT TERMS Alabama Air National Guard; Montgomery Air National Guard Station; Installation Restoration Program; Preliminary Assessment; waste disposal area; waste storage area.

15. NUMBER OF PAGES

16. PRICE CODE

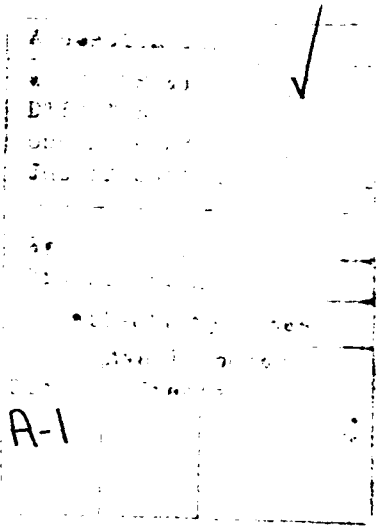
17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified			

INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

232nd COMBAT COMMUNICATIONS SQUADRON
MONTGOMERY AIR NATIONAL GUARD STATION
ALABAMA AIR NATIONAL GUARD
MONTGOMERY, ALABAMA

Prepared for

National Guard Bureau
Andrews Air Force Base, Maryland 20331-6008



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HAZWRAP Support Contractor Office
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Operated by Martin Marietta Energy Systems, Inc.
for the Department of Energy,
Under Contract DE-AC05-84OR21400

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ACRONYM LIST

AGE	Aerospace Ground Equipment
ANG	Air National Guard
CCS	Combat Communications Squadron
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CES	Civil Engineering Squadron
CFR	Code of Federal Regulations
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EO	Executive Order
EPA	Environmental Protection Agency
FR	Federal Register
FS	Feasibility Study
HARM	Hazard Assessment Rating Methodology
HAS	Hazard Assessment Score
HAZWRAP	Hazardous Waste Remedial Actions Program
IRP	Installation Restoration Program
MOGAS	Automotive Gasoline
NGB	National Guard Bureau
OSHA	Occupational Safety and Health Administration
OWS	Oil/Water Separator
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyls
PL	Public Law
POC	Point of Contact
POL	Petroleum, Oil, and Lubricant
RCRA	Resource Conservation and Recovery Act of 1976
R&D	Research and Development
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
SciTek	Science & Technology, Inc.
SI	Site Investigation
USAF	United States Air Force
USC	United States Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UST	Underground Storage Tank
WWII	World War II

EXECUTIVE SUMMARY

A. INTRODUCTION

Science & Technology, Inc. (SciTek) was retained to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 232nd Combat Communications Squadron (CCS), Montgomery Air National Guard (ANG) Station [hereinafter referred to as the Station], Alabama Air National Guard, located at Montgomery, Alabama. For the purpose of this document, the Station shall include the total area leased by the 232nd CCS, at Montgomery, Alabama.

The PA included the following activities:

- o an on-site visit, including interviews with a total of six persons familiar with Station operations, and field surveys by SciTek representatives during the week of April 16-20, 1990;
- o acquisition and analysis of information on past hazardous materials use, waste generation, and waste disposal at the Station;
- o acquisition and analysis of available geological, hydrological, meteorological, and environmental data from federal, state, and local agencies; and
- o the identification and assessment of sites on the Station that may have been contaminated with hazardous wastes.

B. MAJOR FINDINGS

The 232nd CCS has utilized hazardous materials and generated small amounts of wastes in mission-oriented operations and maintenance at the Station since 1984.

Operations that have involved the use of hazardous materials and the disposal of hazardous wastes include vehicle maintenance and aerospace ground equipment (AGE) maintenance. The hazardous wastes disposed of through these operations include varying quantities of petroleum-oil-lubricant (POL) products, acids, paints, thinners, strippers, and solvents.

The field surveys and interviews resulted in the identification of two sites that exhibit the potential for contaminant presence and migration.

C. CONCLUSIONS

It has been concluded there are two sites where a potential for contaminant presence exists.

- Site No. 1 - Perimeter Fence Line (HAS - 66)
- Site No. 2 - Old Access Road/Pipe Storage Yard (HAS - 66)

D. RECOMMENDATIONS

Further work under the IRP is recommended for the two identified sites to determine the presence or absence of contamination.

I. INTRODUCTION

A. Background

The 232nd Combat Communications Squadron (CCS), Montgomery Air National Guard (ANG) Station [hereinafter referred to as the Station] is located at Montgomery, Alabama. The 232nd CCS has been active at their present location since 1984. Both the past and current operations have involved the use of potentially hazardous materials and the disposal of wastes. Because of the use of these materials and the disposal of resultant wastes, the National Guard Bureau (NGB) has implemented the Installation Restoration Program (IRP).
The IRP is a comprehensive program designed to:

- Identify and fully evaluate suspected problems associated with past hazardous waste disposal and/or spill sites on Department of Defense (DoD) installations and

- Control hazards to human health, welfare, and the environment that may have resulted from these past practices.

During June 1980, DoD issued a Defense Environmental Quality Program Policy Memorandum (DEQPPM 80-6) requiring identification of past hazardous waste disposal sites on DoD installations. The policy was issued in response to the Resource Conservation and Recovery Act of 1976 (RCRA) and in anticipation of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, Public Law (PL) 96-510), commonly known as "Superfund." In August 1981, the President delegated certain authority specified under CERCLA to the Secretary of Defense via an Executive Order (EO 12316). As a result of EO 12316, DoD revised the IRP by issuing DEQPPM 81-5 (December 11, 1981), which reissued and amplified all previous directives and memoranda.

Although the DoD IRP and the Environmental Protection Agency (EPA) Superfund programs were essentially the same, differences in the definition of program activities and lines of authority resulted in some confusion between DoD and state/federal regulatory agencies. These difficulties were rectified via passage of the Superfund Amendments and Reauthorization Act (SARA, PL-99-499) of 1986. On January 23, 1987, Presidential Executive Order EO 12580 was issued. EO 12580 effectively revoked EO 12316 and implemented the changes promulgated by SARA.

The most important changes effected by SARA included the following:

- Section 120 of SARA provides that federal facilities, including those in DoD, are subject to all provisions of CERCLA/SARA concerning site assessment, evaluation under the National Contingency Plan [40CFR300], listing on the National Priorities List, and removal/remedial actions. DoD must therefore comply with all the procedural and substantive requirements (guidelines, rules, regulations, and criteria) promulgated by the EPA under Superfund authority.

- Section 211 of SARA also provides continuing statutory authority for DoD to conduct its IRP as part of the Defense Environmental Restoration Program (DERP). This was accomplished by adding Chapter 160, Sections 2701-2707 to Title 10 United States Code (10 USC 160).

- SARA also stipulated that terminology used to describe or otherwise identify actions carried out under the IRP shall be substantially the same as the terminology of the regulations and guidelines issued by the EPA under their Superfund authority.

As a result of SARA, the operational activities of the IRP are currently defined and described as follows:

- **Preliminary Assessment**

  The Preliminary Assessment (PA) process consists of personnel interviews and a records search designed to identify and evaluate past disposal and/or spill sites that might pose a potential and/or actual hazard to public health, public welfare, or the environment. Previously undocumented information is obtained through the interviews. The records search focuses on obtaining useful information from aerial photographs; Station plans; facility inventory documents; lists of hazardous materials used at the Station; Station subcontractor reports; Station correspondence; Material Safety Data Sheets; federal/state agency scientific reports and statistics; federal administrative documents; federal/state records on endangered species, threatened species, and critical habitats; documents from local government offices; and numerous standard reference sources.

- **Site Inspection/Remedial Investigation/Feasibility Study**

  The Site Inspection consists of field activities designed to confirm the presence or absence of contamination at the potential sites identified in the PA. An expanded Site Inspection has been designed by the Air National Guard as a Site Investigation. The Site Investigation (SI) will include additional field tests and the installation of monitoring wells to

provide data from which site-specific decisions regarding remediation actions can be made. The activities undertaken during the SI fall into three distinct categories: screening activities, confirmation and delineation activities, and optional activities. Screening activities are conducted to gather preliminary data on each site. Confirmation and delineation activities include specific media sampling and laboratory analysis to confirm either the presence or the absence of contamination, levels of contamination, and the potential for contaminant migration. Optional activities will be used if additional data is needed to reach a decision point for a site. The general approach for the design of the SI activities is to sequence the field activities so that data are acquired and used as the field investigation progresses. This is done in order to determine the absence or presence of contamination in a relatively short period of time, optimize data collection and data quality, and to keep costs to a minimum.

The Remedial Investigation (RI) consists of field activities designed to quantify and identify the potential contaminant, the extent of the contaminant plume, and the pathways of contaminant migration.

If applicable, a public health evaluation is performed to analyze the collected data. Field tests, which may necessitate the installation of monitoring wells or the collection and analysis of water, soil, and/or sediment samples, are required. Careful documentation and quality control procedures in accordance with CERCLA/SARA guidelines ensure the validity of data. Hydrogeologic studies are conducted to determine the underlying strata, groundwater flow rates, and direction of contaminant migration. The findings from these studies result in the selection of one or more of the following options:

1. **No Further Action** - Investigations do not indicate harmful levels of contamination that pose a significant threat to human health or the environment. The site does not warrant further IRP action, and a Decision Document will be prepared to close out the site.

2. **Long-Term Monitoring** - Evaluations do not detect sufficient contamination to justify costly remedial actions. Long-term monitoring may be recommended to detect the possibility of future problems.

3. **Feasibility Study** - Investigation confirms the presence of contamination that may pose a threat to human health and/or the environment, and some sort of remedial action is indicated. The Feasibility Study (FS) is therefore designed and developed to identify and select the most appropriate remedial action. The FS

may include individual sites, groups of sites, or all sites on an installation. Remedial alternatives are chosen according to engineering and cost feasibility, state/federal regulatory requirements, public health effects, and environmental impacts. The end result of the FS is the selection of the most appropriate remedial action with concurrence by state and/or federal regulatory agencies.

- **Remedial Design/Remedial Action**

The Remedial Design involves formulation and approval of the engineering designs required to implement the selected remedial action. The Remedial Action is the actual implementation of the remedial alternative. It refers to the accomplishment of measures to eliminate the hazard or, at a minimum, reduce it to an acceptable limit. Covering a landfill with an impermeable cap, pumping and treating contaminated groundwater, installing a new water distribution system, and in situ biodegradation of contaminated soils are examples of remedial measures that might be selected. In some cases, after the remedial actions have been completed, a long-term monitoring system may be installed as a precautionary measure to detect any contaminant migration or to document the efficiency of remediation.

- **Research and Development**

Research and Development (R&D) activities are not always applicable for an IRP site but may be necessary if there is a requirement for additional research and development of control measures. R&D tasks may be initiated for sites that cannot be characterized or controlled through the application of currently available, proven technology. It can also, in some instances, be used for sites deemed suitable for evaluating new technologies.

- **Immediate Action Alternatives**

At any point, it may be determined that a former waste disposal site poses an immediate threat to public health or the environment, thus necessitating prompt removal of the contaminant. Immediate action, such as limiting access to the site, capping or removing contaminated soils, and/or providing an alternate water supply may suffice as effective control measures. Sites requiring immediate removal action maintain IRP status in order to determine the need for additional remedial planning or long-term monitoring. Removal measures or other appropriate remedial actions may be implemented during any phase of an IRP project.

B. Purpose

The purpose of this IRP PA is to identify and evaluate suspected problems associated with past waste handling procedures, disposal sites, and spill sites on Station property.

The potential for migration of hazardous contaminants was evaluated by visiting the Station, reviewing existing environmental data, analyzing Station records concerning the use of hazardous materials and the generation of hazardous wastes, and conducting interviews with current Station personnel who had knowledge of past waste disposal techniques and handling methods. Pertinent information collected and analyzed as part of the PA included a records search of the history of the Station; the local geological, hydrological, and meteorological conditions that might influence migration of contaminants; and ecological settings that indicate environmentally sensitive conditions.

C. Scope

The scope was limited to the identification of sites at or under primary control of the Station and evaluation of potential receptors. The PA included:

- o an on-site visit during the week of April 16-20, 1990;
- o acquisition of records and information on hazardous materials use and waste handling practices;
- o acquisition of available geological, hydrological, meteorological, land use and zoning, critical habitat, and related data from federal and state agencies;
- o a review and analysis of all information obtained; and
- o preparation of a summary report to include recommendations for further action.

The subcontractor effort was conducted by the following Science & Technology, Inc. (SciTek) personnel: Mr. Tracy C. Brown, Environmental Analyst; Mr. Charles T. Goodroe, Environmental Protection Specialist; and Mr. Stephen B. Selecman, Geologist/Hydrogeologist. Mr. Russ Dyer of the NGB is Project Officer for this Station. Ms. Patricia Franzen of the Hazardous Waste Remedial Actions Program (HAZWRAP) also participated in the station visit.

The points of contact (POCs) at the Station were Lieutenant Colonel Jesse Pritchett and Chief Master Sergeant Joe Crook. Captain Michelle Fuller (187th Civil Engineering Squadron (CES)) was the representative from their civil engineering support facility.

D. Methodology

The PA began with a visit to the Station to identify all operations that may have utilized hazardous materials or may have generated hazardous wastes. Figure I.1 is a flow chart of the PA methodology.

Five current Station employees familiar with the various operating procedures were interviewed. One former occupant of the property from the U.S. Army Corps of Engineers was interviewed. These interviews were conducted to determine those areas where waste materials (hazardous or nonhazardous) were used, spilled, stored, disposed of, or released into the environment. The interviewees' knowledge and experience with Station operations averaged six years. The interviewee from the U.S. Army Corps of Engineers had been associated with the property for the preceding twenty years.

Records contained in the Station files were collected and reviewed to supplement the information obtained from the interviews.

Detailed geological, hydrological, meteorological, and environmental data for the area were obtained from the appropriate federal, state, and local agencies. A listing of agency contacts is included as Appendix A.

After a detailed analysis of all the information obtained, it was concluded that two sites may be potentially contaminated with hazardous wastes. Under the IRP program, when sufficient information is available, sites are numerically scored using the Air Force Hazard Assessment Rating Methodology (HARM). A description of HARM is presented in Appendix B.

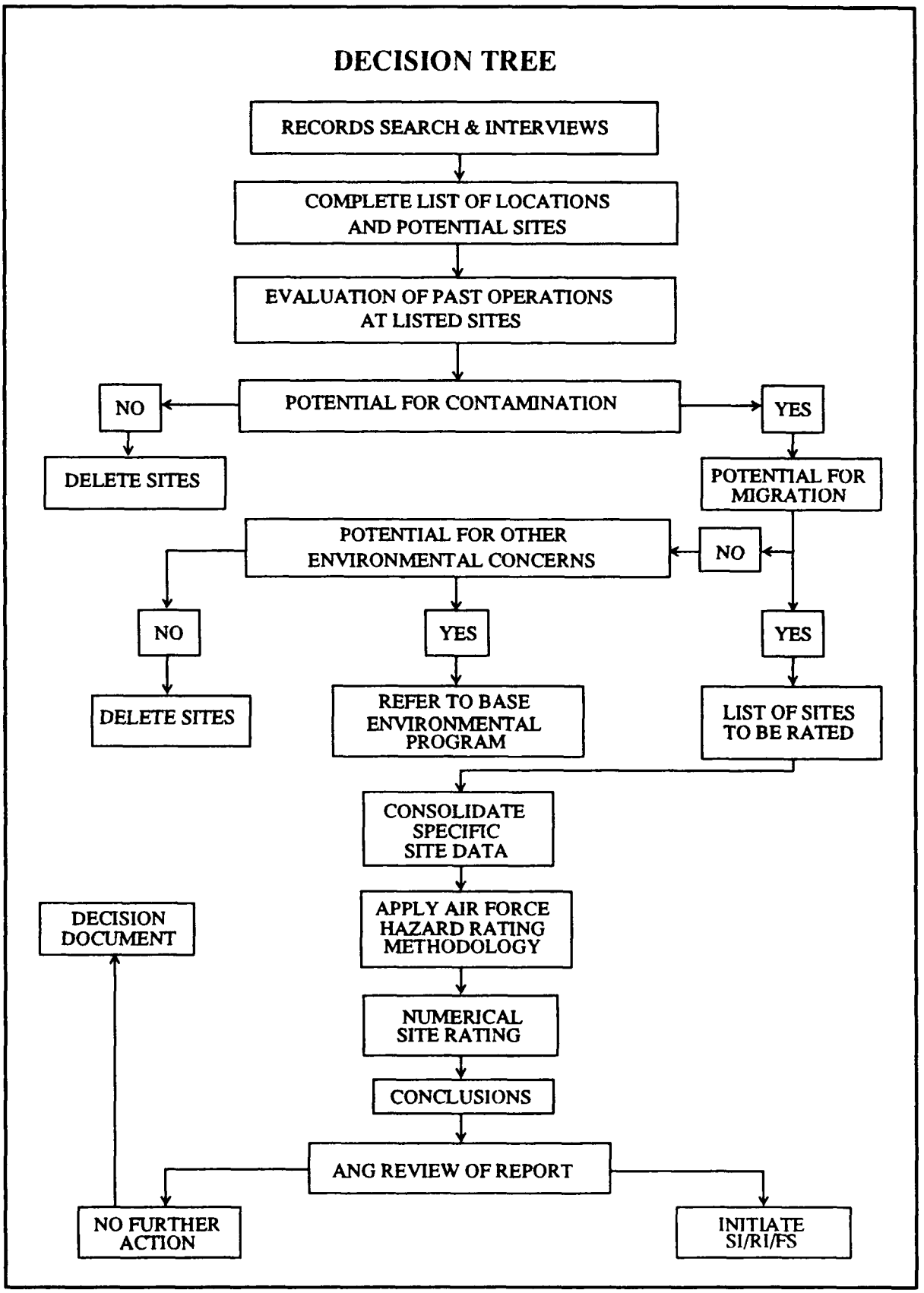


Figure I.1

Preliminary Assessment Methodology Flow Chart

II. INSTALLATION DESCRIPTION

A. Location

The 232nd CCS is located approximately one and a half miles south of Maxwell Air Force Base within the city and county of Montgomery, Alabama. It is on the corner of Hayneville Road and an extension of Hardwick Street. The Station is located in a portion of a former World War II (WW II) base known as the Montgomery Holding and Reconsignment Depot. Figure II.1 illustrates the location and boundaries of the Station.

The Station, which consists of two separate areas, occupies 26.6 acres. The main Station occupies 11.6 acres and contains structures to house the Headquarters and all maintenance activities. The remaining 15 acres is a flat, grassy field and is used to conduct training. The population during the weekday numbers 26 members. Unit Training Assembly occurs one weekend per month. The Station population during this weekend is 210 members.

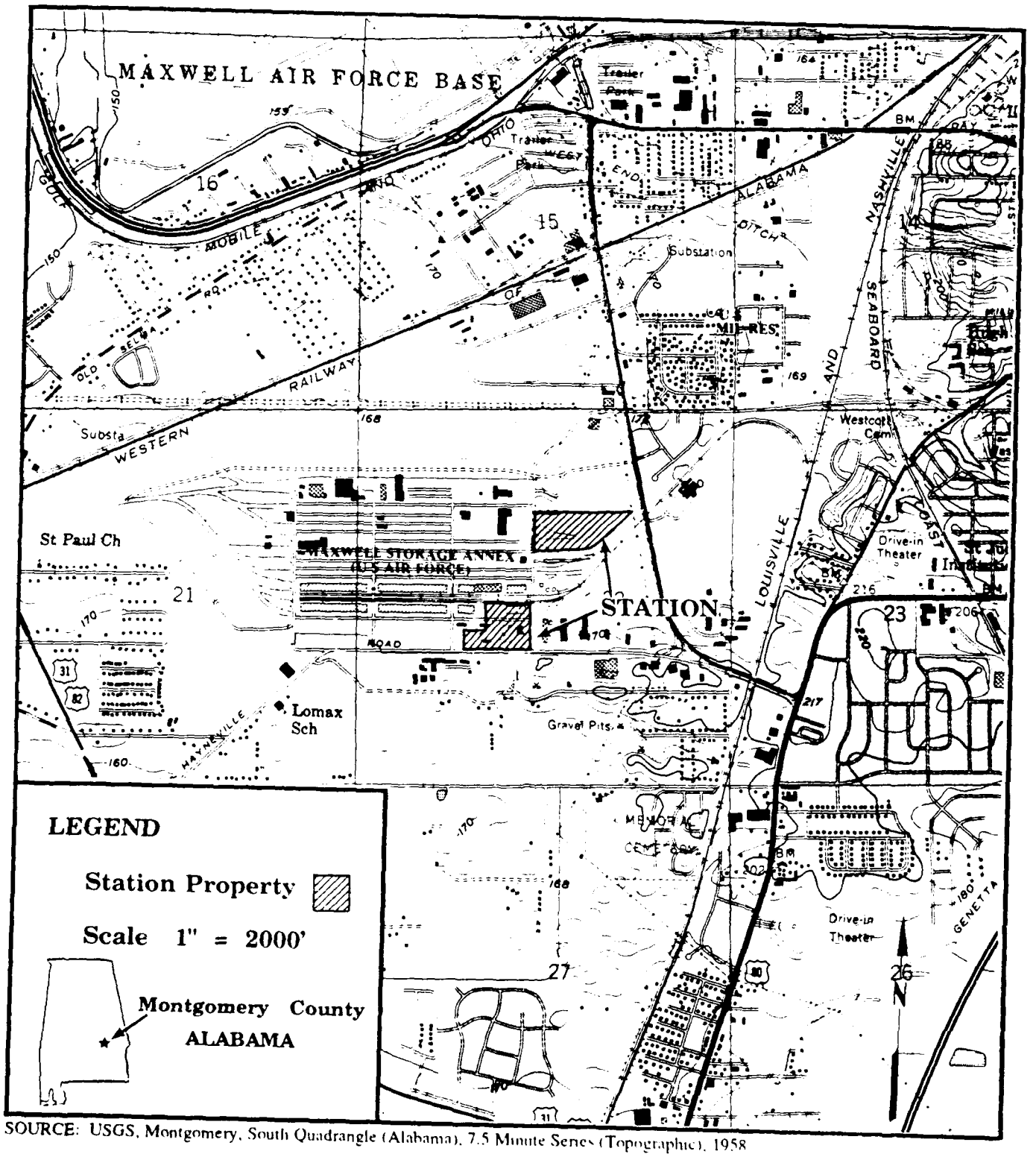
B. Organization and History

Prior to its present designation as the 232nd CCS, the unit was known as the 232nd Combat Information Systems Squadron. The mission of the unit remained essentially the same. The mission of the 232nd CCS is to train, equip, deploy, install, operate, and maintain tactical communications, air traffic control, and navigational aids worldwide in support of gaining command and rapid deployment force taskings.

The property the Station now occupies was originally a portion of land developed as a warehousing and distribution center during WW II. The U.S. Army Corps of Engineers obtained the facilities in July 1962 and then used them as a service base for core drilling operations. In September 1983, the Corps moved to Mobile, Alabama. In December of 1984, the 232nd CCS moved from Dannelly Field to their present location and has occupied the property since that date.

The principal structure is a large warehouse housing the Headquarters and Administrative elements of the 232nd CCS. Other structures on the property of WW II vintage are two motor vehicle and aerospace ground equipment (AGE) maintenance buildings and a one-story machine shop building. A newer, prefabricated metal building is also on the property and is used as a storage facility.

The property has always supported a maintenance function including support of the Holding and Reconsignment Depot and U.S. Army Corps of Engineers'



SOURCE: USGS, Montgomery, South Quadrangle (Alabama), 7.5 Minute Series (Topographic), 1958

Figure II.1

Location Map of
the Montgomery Air National Guard Station

drilling operations, as well as its present use for the repair and servicing of motor vehicles and AGE items, and, to a lesser degree, electronic equipment. Underground storage tanks (USTs) for heating fuel, diesel oil, and automotive gasoline (MOGAS) substantiate the use of this property.

Materials recognized as hazardous today have always been generated on this property. A common practice of using waste oil or fuel for dust and weed control has taken place in the past. With the awareness of hazardous materials and the recognition of their impact on the environment, acceptable disposable practices and procedures have evolved. The majority of hazardous wastes are now collected and disposed of through contractors and the Defense Reutilization and Marketing Office (DRMO).

The 15 acres of property that are used for training show no obvious environmental degradation due to hazardous materials or hazardous wastes.

III. ENVIRONMENTAL SETTING

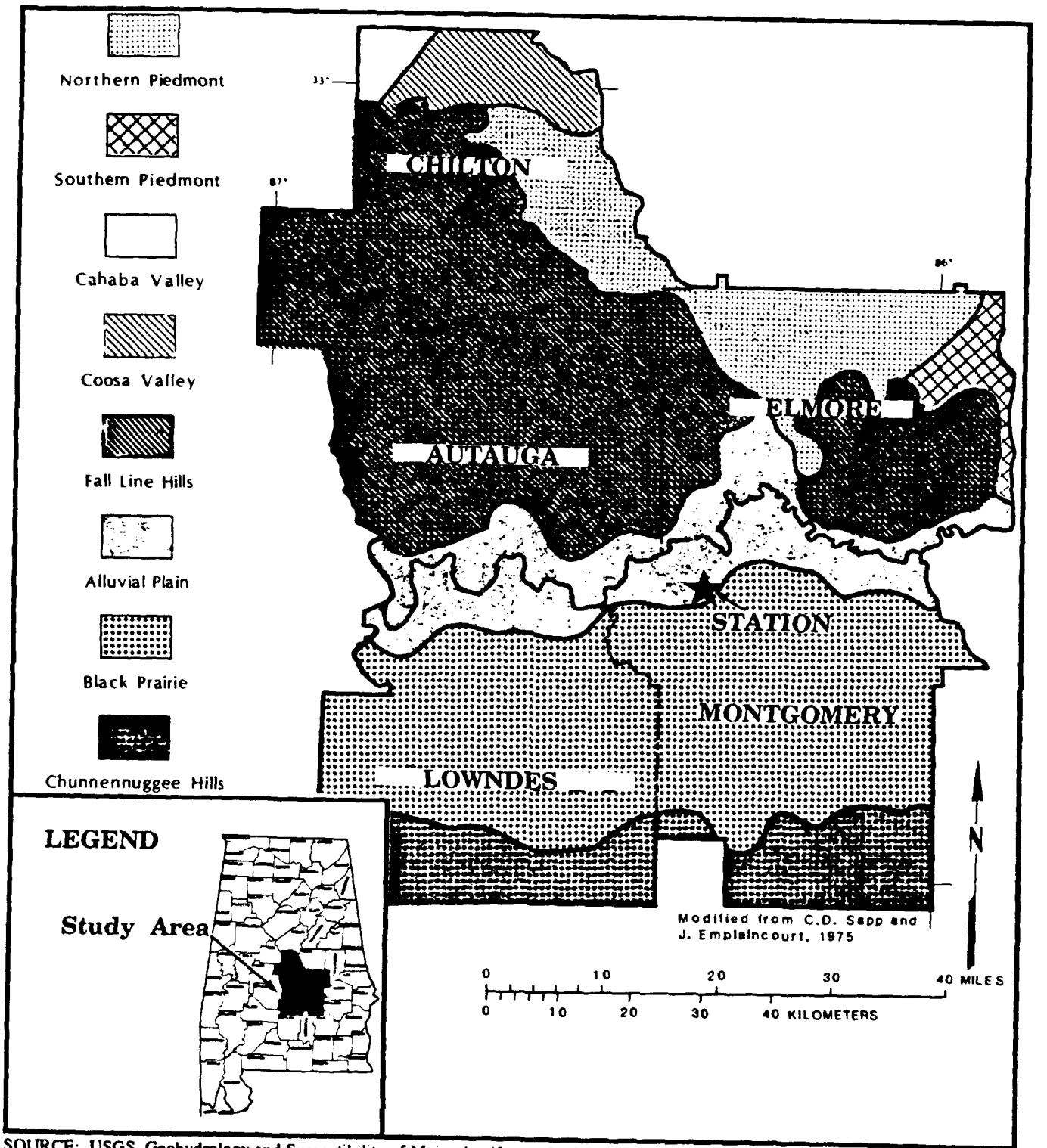
A. Meteorology

The following climatological data is largely derived from the Soil Survey of Montgomery County, Alabama (United States Department of Agriculture (USDA): Soil Conservation Service, September 1960). Montgomery County has a humid, mild, almost subtropical climate. The average annual precipitation, based on an 85-year record (1873-1958), was 51.12 inches and ranged from 26.82 inches in 1954 to 78.25 inches in 1929. By calculating net precipitation according to the method outlined in the Federal Register (47 FR 31224, July 16, 1982), a net precipitation value of 7.12 inches per year is obtained. Rainfall intensity, based on 1-year, 24-hour rainfall, is 2.75 inches (calculated according to 47 FR 31235, July 16, 1982, Figure 8). Most precipitation that falls from late April to early June occurs in the form of showers and thundershowers. Droughts have occurred in the spring, in the late summer, and in the early fall. From December until early April, average precipitation is high, and rivers overflow frequently. The average annual temperature over an 85-year period (1873-1958) was 68°F. The average monthly temperature ranged from 49.2°F in January to 81.7°F in July. Winds are usually light. Strong winds generally last only a short time, and dangerous or catastrophic winds are rare.

B. Geology

Montgomery County is in the northern part of the East Gulf Coastal Plain and encompasses parts of three physiographic districts: the Alluvial Plain, the Black Prairie, and the Chunnennuggee Hills. Specifically, the Station is located in the southern part of the Alluvial Plain district adjacent to the northern boundary of the Black Prairie district as illustrated in Figure III.1 (Scott et al, 1987). The topography is relatively flat in the immediate vicinity of the Station with surface elevations ranging from 160 to 168 feet above mean sea level.

Geologic formations that crop out in Montgomery County are of sedimentary origin and range from Late Cretaceous rocks overlying the crystalline basement complex to Pleistocene terrace deposits and Recent alluvium (Knowles et al, 1963). These stratigraphic units are shown in Figure III.2 where a detailed lithologic description and average thickness for each unit is given. The Cretaceous formations dip to the south at a rate of 40 to 50 feet per mile. Older formations crop out to the north except where overlain by Quaternary deposits, and younger formations crop out to the south as illustrated in Figure III.3 (Scott et al, 1987).



SOURCE: USGS, Geohydrology and Susceptibility of Major Aquifers to Surface Contamination in Alabama: Area 8, 1987.

Figure III.1

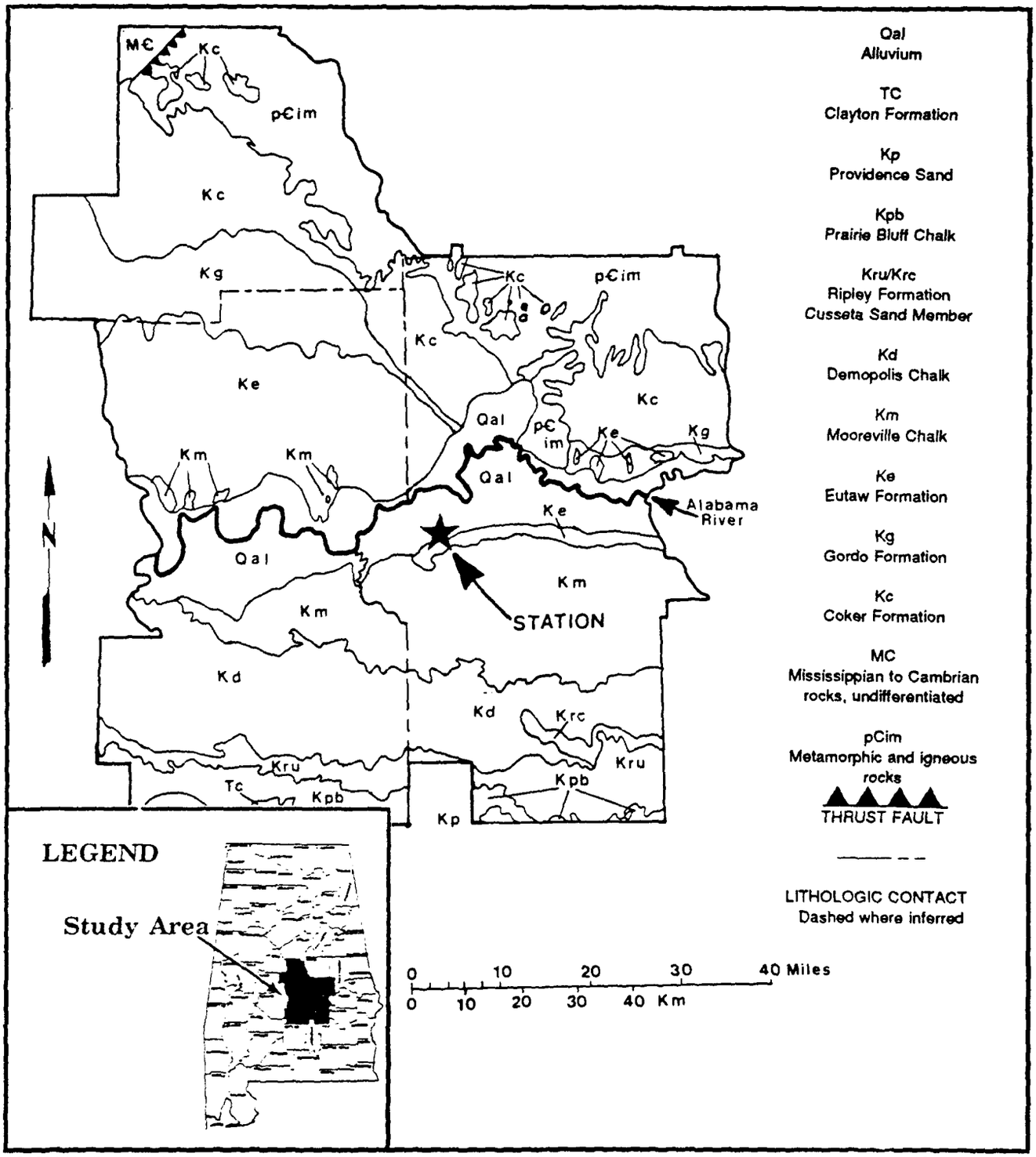
Physiographic Map of the Area

System	Series	Subdivision		Thickness (ft.)	Character	Water supply
Quaternary	Recent	Alluvium		0-20	Sand, gravel, silt, and clay, poorly sorted.	Yields small quantities of water to domestic and stock wells.
	Pleistocene	Terrace deposits		0-80	Sand, gravel, and clay, reddish-brown, poorly sorted.	Yield large quantities of water to municipal, industrial, and domestic wells.
Cretaceous	Upper Cretaceous	Selma group	Mooreville chalk	0-260	Chalk, clayey, sandy, fossiliferous. Base of chalk is glauconitic and contains phosphate nodules.	Yields little or no water to wells.
		Eutaw formation		200-400	Greenish-gray sand, fine- to medium-grained, glauconitic; greenish-gray clay, glauconitic, interbedded with sand. Thin beds of white sandstone in upper part.	Sands in the upper and lower part of formation are good aquifers. These aquifers yield moderate to large quantities of water to municipal and industrial wells.
		Tuscaloosa group	Gordo formation	210-350	Yellow sand, medium- to very coarse-grained, poorly sorted; varicolored clay interbedded with sand. Beds of gravel in lower part.	Sands in the upper and middle part of formation are good aquifers and supply water for municipal, industrial, and domestic use. Supplies water to flowing wells in low areas along Alabama River.
			Coker formation	550±	Greenish-gray sand, fine- to medium-grained; greenish-gray clay, lignitic, interbedded with sand.	Sands in the upper part of formation are good aquifers and supply water for municipal use.
Precambrian					Mica schist.	Yields no water to wells.

SOURCE: Powell et al., Interim Report on the Geology and Ground-Water Resources of Montgomery, Alabama and Vicinity, 1957.

Figure III.2

Generalized Stratigraphic Column of the Area



SOURCE: Scott et al., Geohydrology and Susceptibility of Major Aquifers to Surface Contamination in Alabama: Area 8, USGS, 1987.

Figure III.3

Surficial Geologic Map of the Area

The Station is located in the Alabama River ancestral flood plain where it is underlain by Quaternary alluvial and terrace deposits (Figure III.3). Alluvial deposits range in thickness from 20 to 80 feet and consist generally of porous, poorly sorted sand, gravel, silt, and clay. At the Station location, the alluvium is approximately 45 feet thick and directly overlies the Cretaceous Eutaw Formation that crops out a short distance to the east in the adjacent hills. The Eutaw Formation consists of fine- to medium-grained glauconitic sand interbedded with calcareous sand and clay, along with sandy clay. Its thickness is approximately 200 to 250 feet at this location (Knowles et al, 1963).

Soils underlying the Station are composed of the Izagora and Wickham fine sandy loams and the Roanoke silty loam. The southern segment of the Station is underlain solely by the Izagora, while the northern portion consists of the Wickham soils in the northwest and Roanoke soils in the southeast. Generally, the soil thickness averages from 1 to 4 feet with permeabilities classified as moderate (0.63 to 2.0 inches per hour or 4.45×10^{-4} to 1.41×10^{-3} cm/sec) to moderately slow (0.20 to 0.63 inches per hour or 1.41×10^{-4} to 4.45×10^{-4} cm/sec) for the group. The information pertaining to soils contained in the text was derived from the Soil Survey of Montgomery County, Alabama (United States Department of Agriculture (USDA): Soil Conservation Service, September 1960). Soil borings are not available for the Station.

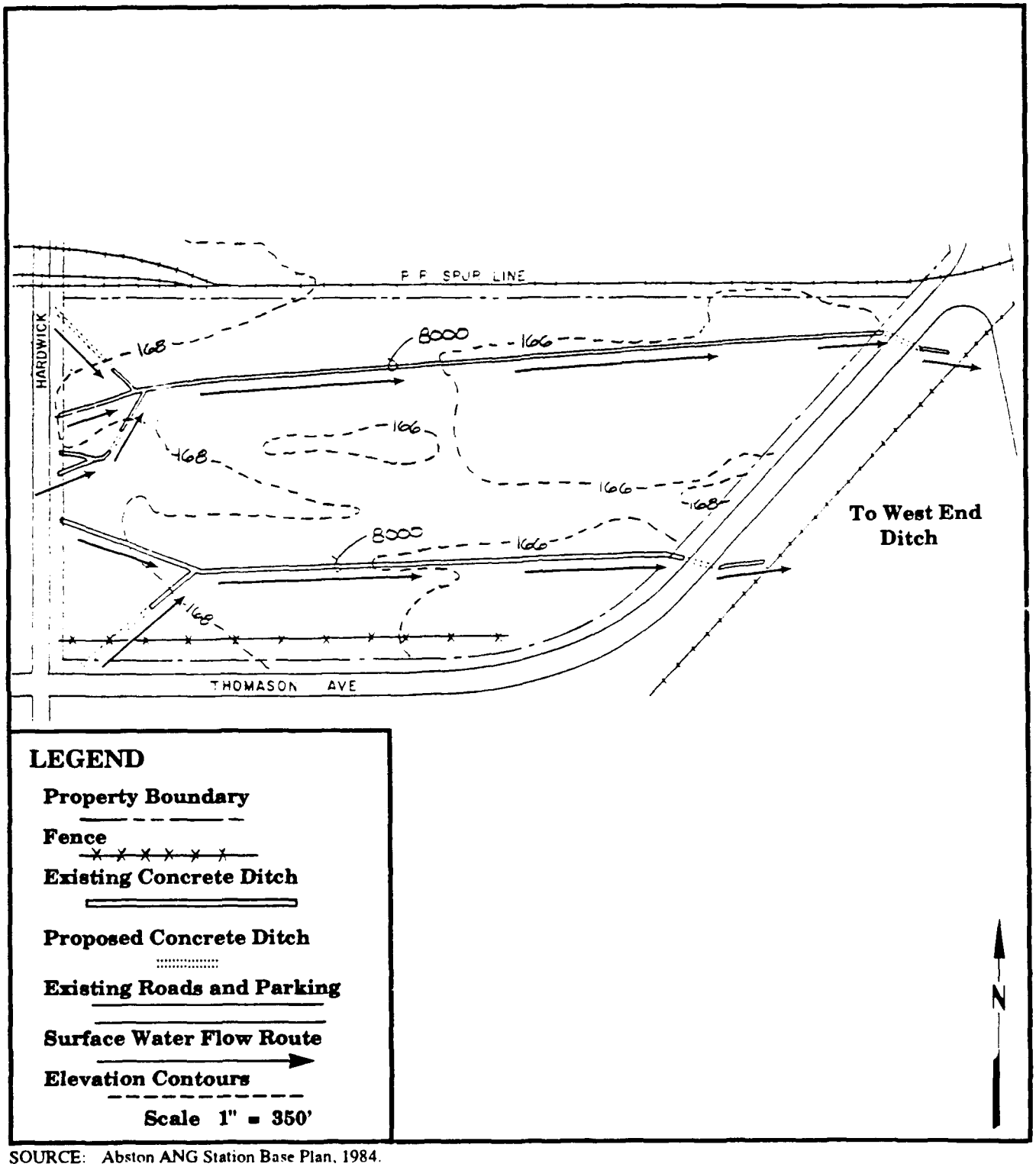
C. Hydrology

1. Surface Water

The Station is located in the Alabama River drainage basin and is drained locally in two directions. The southernmost half of the southern segment is drained by the Pineview Homes Ditch. The northernmost half of the southern segment and the northern segment are drained by the West End Ditch (Figures III.4A and B). The Pineview Homes Ditch transports the water westward approximately 2.25 miles to Catoma Creek where it is discharged 5.5 miles downstream into the Alabama River. The West End Ditch meanders northward 7 miles where it outflows directly into the Alabama River (Figure III.5). Both the northern and southern segments of the Station have been classified as located outside the 100-year flood plain of the Alabama River (Federal Emergency Management Agency, 1987).

2. Groundwater

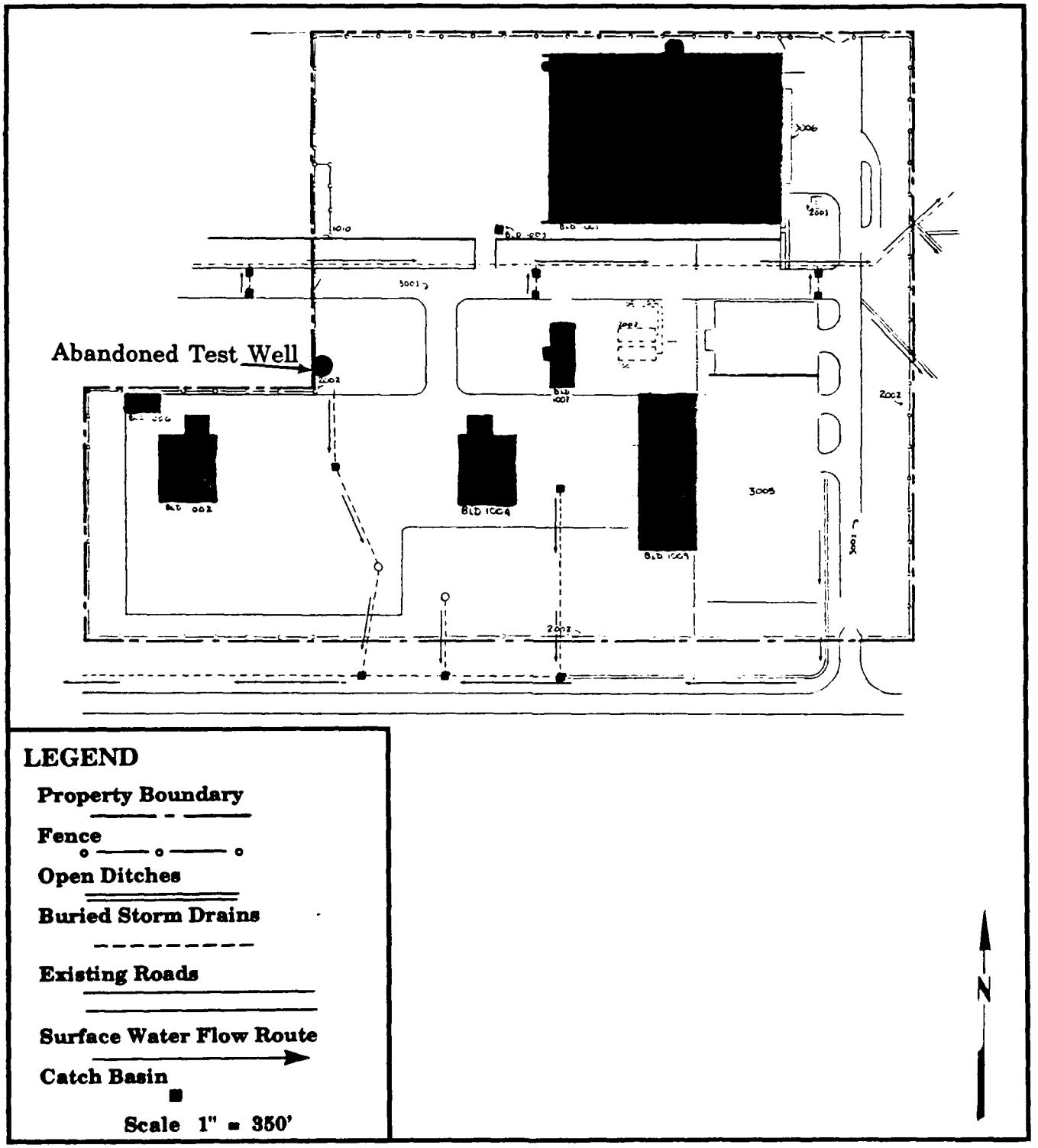
The principal aquifers in Montgomery County are the Eutaw, Gordo, and Coker Formations. More specifically with respect to the Station, the Eutaw Formation



SOURCE: Abston ANG Station Base Plan, 1984.

Figure III.4A

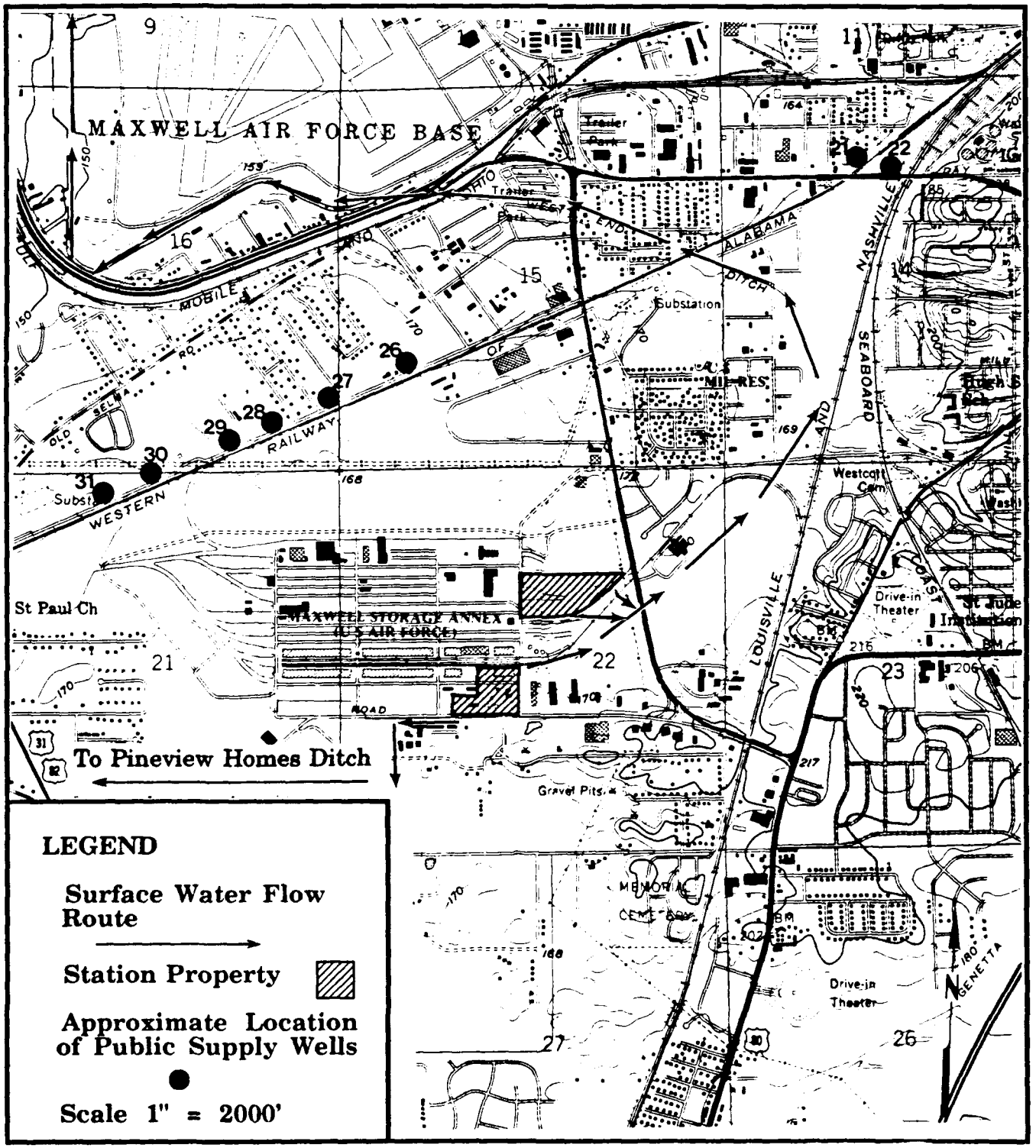
Station Drainage Map (North)



SOURCE: Montgomery ANG Station Base Plans, 1986.

Figure III.4B

Station Drainage Map (South)



SOURCE: USGS, Montgomery, South Quadrangle (Alabama), 7.5 Minute Series (Topographic), 1981.

Figure III.5

Surface Water Flow Route Map

and the Quaternary Alluvium are of primary concern. The Eutaw is the shallowest of the major aquifers and immediately underlies the porous alluvium in the vicinity of the Station.

The Eutaw is a confined artesian aquifer except where it crops out near the surface and is in contact with porous surficial deposits. Groundwater recharge of the Eutaw aquifer occurs in areas of near surface outcrops. The Eutaw aquifer outcrops near the surface and underlies the alluvial deposits of the Alabama River in Montgomery County and westward from that point. The Eutaw aquifer is in hydraulic communication with the permeable alluvial deposits, and it is principally recharged by these deposits (Powell et al, 1957 and Scott et al, 1987). As a result of the Station being located in the flood plain of the Alabama River, it is situated in a principal recharge area for the Eutaw aquifer. Recharge of the Eutaw and Gordo aquifers in the city of Montgomery area is greatly enhanced by cones of depression in the potentiometric surface that have formed in response to pumpage from municipal wells (Scott et al, 1987).

The direction of groundwater movement in the Eutaw aquifer at the Station location is interpreted from potentiometric maps as being to the northwest (Scott et al, 1987). The Eutaw is screened in wells in both the Montgomery County North and West Municipal Water Well Fields from depths of 100 to 200 feet, respectively. The Montgomery County West Municipal Water Well Field is the closest public water supply, and the nearest well is located approximately 0.5 miles north/northwest from the Station as shown in Figure III.5 (CH^2M Hill, 1989). Pumpage from the Montgomery County West Municipal Water Well field locally enhances groundwater movement in a northwesterly direction at the Station location; this is attributed to a cone of depression existing in the potentiometric surface that results from large withdrawals of groundwater from the field. Regional groundwater movement, however, takes place in a down dip or southeasterly direction from the principal recharge area (Scott et al, 1987).

Alluvium deposits underlying the flood plain at the Station location are a potential source of water supply; however, they are not generally developed for public use except in a few cases in the Montgomery County North Municipal Water Well Field (Scott et al, 1987). The alluvium is an unconfined aquifer and is recharged locally. According to John C. Scott of the United States Geological Survey (USGS) in Montgomery, the minumum depth from the surface to the water table occurs between 6 to 10 feet at the Station. Principal movement of groundwater here is also in a northwesterly direction. Groundwater movement in alluvium deposits can be significantly influenced on a localized basis through pumpage from shallow wells (Scott et al, 1987). However, this should not be the case at the Station location since no actively pumping wells exist in the immediate vicinity.

One well exists on the southern segment of the Montgomery Station (Figure III.4B). Investigations indicate that it was drilled to a depth of 250 feet in the Eutaw Formation. A 12-inch welded casing head exists at the surface, but the depth and method used to set the casing are unknown. The investigation revealed that the well was used to test various pumps and was never used as a potable water source. Therefore, the well was not reported to the State Geological Survey, and formal records do not exist.

The Station is located in an area of high susceptibility for groundwater contamination should a release occur. This is attributed to the relatively porous soils and very porous alluvial deposits underlying the Station. Alluvial deposits act as both a shallow aquifer and as a direct source of groundwater for the Eutaw Formation. The alluvium directly overlies and is in hydraulic communication with the Eutaw in its principal recharge area. Furthermore, the withdrawal of large volumes of groundwater from the Montgomery County West Municipal Water Well Field have produced a cone of depression in the potentiometric surface at the Eutaw level (Scott et al, 1987). These conditions further enhance local recharge of the aquifer at this location.

D. Critical Habitats/Endangered or Threatened Species

According to current records maintained by the Alabama Department of Conservation and Natural Resources, Alabama Natural Heritage Program, no endangered or threatened species of flora or fauna have been identified within a 1-mile radius of the potential sites identified at the Station. No designated critical habitats exist in this area.

The U.S. Fish and Wildlife Service has not surveyed and mapped wetlands within a 1-mile radius of the potentially contaminated sites at the Station. However, the Montgomery South, Alabama quadrangle map (United States Geological Survey, 1981) suggests the presence of minor wetlands approximately one-half mile north and northwest of the Station.

The Station is located in a major recharge area for the Eutaw aquifer, which is an important source of potable water for the residents of Montgomery and especially for residents of rural areas in Montgomery County (Scott et al, 1987). For this reason, a Factor Rating of 3 for Critical Environments is used to calculate the Hazard Assessment Scores (HASs) for potential sites at the Station.

IV. SITE EVALUATION

A. Activity Review

A review of Station records and interviews with personnel were used to identify specific operations in which the majority of hazardous materials and/or hazardous wastes are used, stored, processed, and disposed. Table IV.1 provides a history of waste generation and disposal for operations conducted by shops at the Station. If an item is not listed on the table on a best-estimated basis, that activity or operation produces negligible (less than 1 gallon/year) waste requiring disposal.

The potable water supply and sanitary sewer services for the Station are provided solely by the Water Works and Sanitary Sewer Board of the City of Montgomery. An abandoned pump test well is located just inside the West Perimeter Fence (Figure III.4B). Although the well has never been used as a source of potable water, it was sealed with a steel locking cap but was never officially plugged and abandoned by either removing the casing or grouting the wellhead area.

B. Disposal/Spill Site Information, Evaluation, and Hazard Assessment

Six persons were interviewed to identify and locate potential sites that may have been contaminated by hazardous wastes as a result of past Station operations. Two potentially contaminated sites were identified through the interviews.

Each of these sites was rated by application of the United States Air Force (USAF) HARM (Appendix B), and since the potential for contaminant migration exists at these two sites, each is recommended for further investigation under the IRP program. Copies of completed HARM forms and an explanation of the factor rating criteria used for site scoring are contained in Appendix C.

The potential exists for contaminant migration at each of the two rated sites. Contaminants that may have been released at these sites have the potential to be transported by groundwater and surface water. The seasonal high water table, which is 6 to 10 feet below the ground surface at the Station, has the highest risk for groundwater contamination. If the shallow groundwater becomes contaminated by hazardous wastes, the deeper aquifers may also be contaminated by groundwater migration. Released contaminants that are exposed on the ground surface have the potential to be transported by surface water migration into Catoma Creek and the Alabama River.

The locations of the two rated sites are provided on Figure IV.1. The following items are descriptions of the two potential sites identified at the Station:

Table IV.1 Hazardous Materials/Hazardous Wastes Disposal Summary: Montgomery Air National Guard Station, Montgomery, Alabama.

Shop Name and Location	Possible Hazardous Wastes	Estimated Quantities (Gallons/Year)	Method of Disposal 1984	1986	1988	1990
Vehicle Maintenance (Bldg. 1002)	Engine Oil	300	CONTR			
	Battery Acid	70	DRMO			
	Ethylene Glycol	25	STORM			
	Lubricating Oil	10	CONTR			
	Hydraulic Oil	2	AM/TRASH			
	Paint Thinner	4	GRND			
	Brake Fluid	2	AM/TRASH			
	Diesel Fuel	40	CONTR			
	Grease	2 lbs	RAGS/TRASH			
	MOGAS	5	CONTR			

KEY:

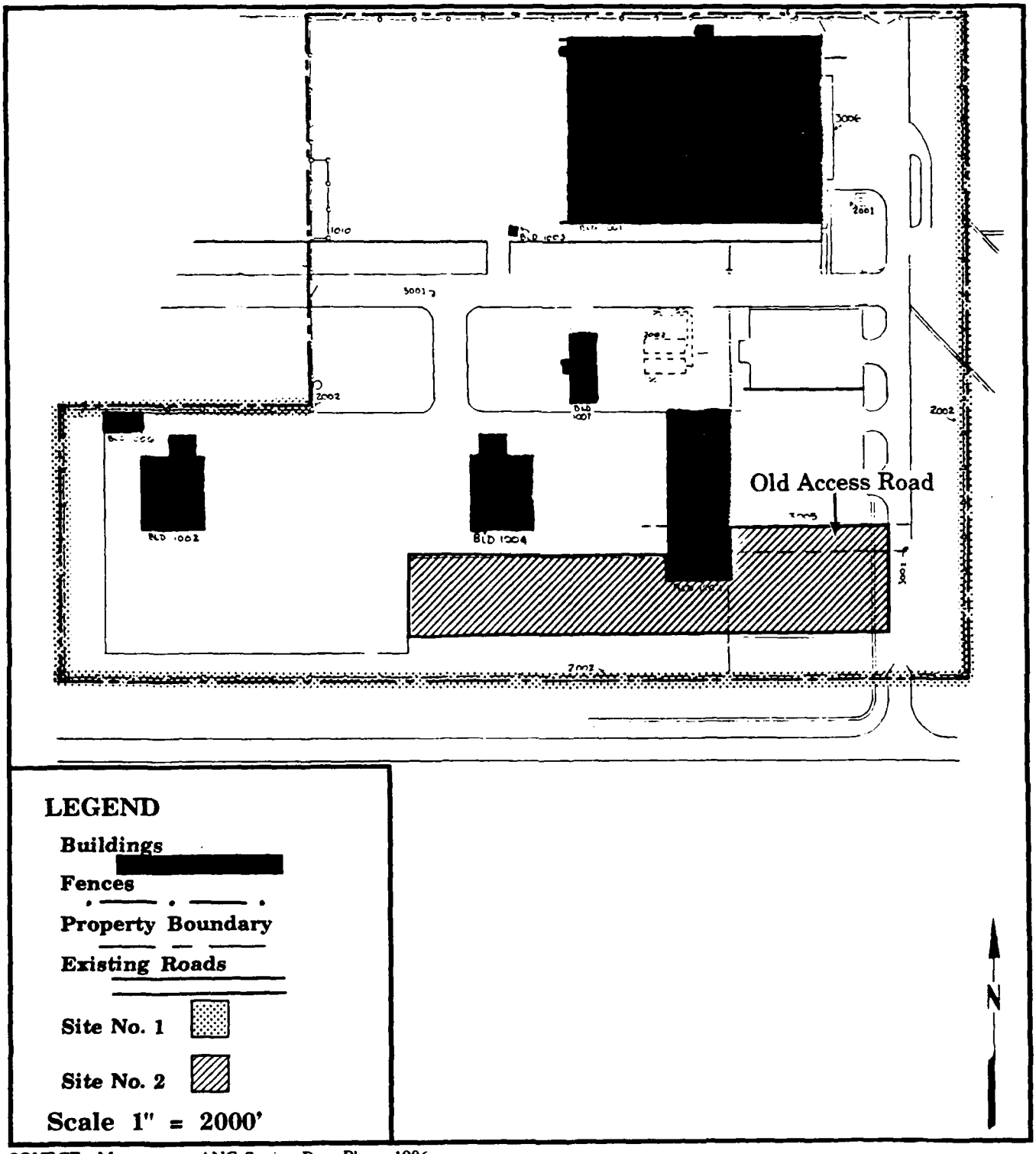
AM/TRASH - Cleaned up with absorbent materials and disposed of in trash that goes to City landfill.
CONTR - Disposed of through a contractor.
DRMO - Disposed of through the Defense Reutilization & Marketing Office. (Prior to 1986, this office was known as the Defense Property Disposal Office (DPDO).)
GRND - Disposed of on the ground.
NLU - No longer used.
PROC - Material used up in process (i.e. evaporation).
RAGS/TRASH - Wiped onto rags and disposed of in trash that goes to City landfill.
STORM - Disposed of through the storm sewer.

Table IV.1 Hazardous Materials/Hazardous Wastes Disposal Summary: Montgomery Air National Guard Station, Montgomery, Alabama (continued).

Shop Name and Location	Possible Hazardous Wastes	Estimated Quantities (Gallons/Year)	Method of Disposal 1984	1986	1988	1990
Aerospace Ground Equipment (AGE) Maintenance (Bldg. 1004)	Engine Oil	150	CONTR			
	Strippers/Thinners	1	PROC			
	PD-680	6	PROC		NLU	
	Gunk	30	STORM			
	Battery Acid	80	DRMO			
	MEK	8	RAGS/TRASH			
	Lubrication Oil	1	PROC			

KEY:

AM/TRASH - Cleaned up with absorbent materials and disposed of in trash that goes to City landfill.
CONTR - Disposed of through a contractor.
DRMO - Disposed of through the Defense Reutilization & Marketing Office. (Prior to 1986, this office was known as the Defense Property Disposal Office (DPDO).)
GRND - Disposed of on the ground.
NLU - No longer used.
PROC - Material used up in process (i.e. evaporation).
RAGS/TRASH - Wiped onto rags and disposed of in trash that goes to City landfill.
STORM - Disposed of through the storm sewer.



SOURCE: Montgomery ANG Station Base Plans, 1986.

Figure IV.1

Potential Sites at the Station

Site No. 1 - Perimeter Fence Line (HAS - 66)

The entire Station is surrounded by a galvanized steel fence. Site No. 1 consists of the area along the East Perimeter Fence, the South Perimeter Fence, and the south half of the West Perimeter Fence (Figure IV.1).

From 1965 to 1980, U.S. Army Corps of Engineers personnel sprayed diesel fuel along the fence line to kill weeds. Approximately 100 gallons of fuel were used during each spraying, and the spraying was done once per year. Over a 15-year period, approximately 1500 gallons of diesel fuel were sprayed on Site No. 1.

Since there is a potential for soil and groundwater contamination at this site, a HAS was calculated.

Site No. 2 - Old Access Road/Pipe Storage Yard (HAS - 66)

From 1970 to 1975, when the U.S. Army Corps of Engineers conducted operations on the Station lease area, waste petroleum products from heavy equipment maintenance operations were stored in a 500 gallon, trailer-mounted tank. These waste products were primarily engine oil and hydraulic oil, but small quantities of diesel fuel and leaded MOGAS may have been mixed with them. The portable tank was equipped with a spraying rig, and when the tank was full, its contents were sprayed on the Station grounds to settle dust on a dirt access road and to kill grass growing in adjacent areas. A large portion of this sprayed area has been designated as Site No. 2.

Site No. 2 is an essentially rectangular area that begins near the southeast corner of the Station and parallels the South Perimeter Fence (Figure IV.1). Its maximum dimensions are approximately 100 feet north-south by 460 feet east-west. The Old Access Road was located within this area and along the east half of its north edge. It extended west from the present Station entrance road and under current Building 1009 (Mobility Building), which had not been built at the time of the spraying. The Old Access Road terminated at the old concrete pavement that begins near the west wall of the building. The remainder of the site was once occupied by a locomotive maintenance building and the Pipe Storage Yard. The foundation of the locomotive maintenance building is still present on the west end of the site. Numerous pipe racks were once located throughout the central and east portions of the site. All unoccupied areas that were easily accessible to the trailer and a pulling vehicle were subject to spraying.

Site No. 2 was sprayed with 500 gallons of waste petroleum products once each year. Therefore, 2500 gallons of waste were applied to the site over a five-year period. Eighty percent (2000 gallons) was applied to the Old Access Road. The remaining 20% (500 gallons) was sprayed on the Pipe Storage Yard

and in the area now occupied by the paved parking lot east of Building 1009. This latter area was not included in the site because it is considered to be effectively capped by the pavement.

With possible soil contamination at Site No. 2, there is also a potential for groundwater contamination. Consequently, a HAS was calculated for this site.

C. Other Pertinent Facts

- Trash and non-hazardous solid wastes are disposed of by an outside contractor. The Station's contractor for 1990 is Browning-Ferris Industries.

- There are no oil/water separators (OWS) at the Station.

- A pair of abandoned, World War II vintage USTs are located 120 feet south of Building 1001 (Headquarters Building). These tanks may have a capacity of 10,000 gallons each, and they probably contained leaded MOGAS and diesel fuel.

  From 1962 to 1981, these tanks were used by the U.S. Army Corps of Engineers. According to an interviewee, the Corps maintained careful checks on the contents of the tanks, and there is no evidence that they leaked during this period. The tanks were abandoned in 1981. With the possible exception of an unpumpable residuum, all remaining fuel was removed from these tanks at the time of abandonment.

  When Alabama Air National Guard activities began at the Station in 1984, the Station wanted to use these tanks. At that time, the Base Fuels Laboratory of the 187th TFG took liquid samples from each tank for visual examination. This examination revealed a mixture of fuel and water in each tank. Written records of this examination are no longer available, but interview information indicated that there was more water than fuel in the tanks. Liquid levels in the tanks may have been about one foot and two feet, respectively. After this examination, the Alabama Air National Guard never used the tanks.

  An abandoned UST once used to contain heating oil (Number 2 diesel) is located on the west side of Building 1007 (Wire Maintenance). This tank, believed to have a capacity of 500 gallons, dates to World War II and was used by the U.S. Army Corps of Engineers between 1962 and 1977. It was abandoned by the Corps in 1977. An interviewee estimated that a small quantity (50 gallons) of heating oil remained in the tank at the time of abandonment.

During its period of use, there was no indication that this tank ever leaked. Between 1977 and 1983, the tank began taking on water, perhaps through a subsurface perforation in the tank. During this period, a small quantity of the remaining heating oil floated out of the tank's access pipe and onto the soil surface surrounding it. A small area (1.5 feet in diameter) of stressed vegetation exists on the north side of the access pipe. The access pipe is currently capped.

This tank was never used by the Alabama Air National Guard.

- The Station has a draft Oil and Hazardous Material Pollution Contingency Plan.

- From an unknown time prior to 1984 until 1985, the middle pole/platform-mounted transformer on the west side of Building 1007 leaked dielectric oil to the soil beneath it. When these transformers were replaced in 1985, approximately 5 to 10 gallons of oil had leaked from this transformer. The oil in these transformers was sampled, and a contract laboratory analyzed the samples for polychlorinated biphenyls (PCBs). The analytical report, on file at the 187th CES in Montgomery, indicated a concentration of < 3 ppm (none detected/below the detection limit) of PCBs. The spilled oil, which created a stain about 3 feet in diameter, was never cleaned up. There is no stressed vegetation at the spill location.

  The middle pole/platform-mounted transformer on the west side of Building 1002 (Vehicle Maintenance) may have leaked dielectric oil prior to replacement of all three transformers in 1985. Analyses of oil samples from these transformers indicated < 5 ppm concentrations of PCBs.

V. CONCLUSIONS

Information obtained through interviews with Station personnel, reviews of records, and field observations was used to identify possible spill or disposal sites on the Station property. Two potentially contaminated sites were identified.

The following sites exhibit the potential for contaminant migration through surface water, soil, and/or shallow groundwater:

- Site No. 1 - Perimeter Fence Line (HAS - 66)
- Site No. 2 - Old Access Road/Pipe Storage Yard (HAS - 66)

VI. RECOMMENDATIONS

The PA identified two potentially contaminated sites. As a result, additional work under the IRP is recommended for these sites to confirm the presence/absence of contamination.

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GLOSSARY OF TERMS

ALLUVIAL - Pertaining to or composed of alluvium, or deposited by a stream or running water.

ALLUVIUM - A general term for detrital deposits made by streams on river beds, flood plains, and alluvial fans. The term applies to stream deposits of recent time.

ANNUAL PRECIPITATION - The total amount of rainfall and snowfall for the year.

AQUIFER - A body of rock that is sufficiently permeable to conduct ground water and yield economically significant quantities of water to wells and springs.

ARGILLACEOUS - Like or containing clay.

ARTESIAN AQUIFER - A water-bearing bed that contains water under hydrostatic pressure.

BASIN - (a) A depressed area with no surface outlet; (b) A drainage basin or river basin; (c) A low area in the Earth's crust, of tectonic origin, in which sediments have accumulated.

BAY - A wide, curving open indentation, recess, or inlet of a sea or lake into the land or between two capes or headlands, larger than a cove, and usually smaller than, but of the same general character as a gulf.

BED [stratig] - The smallest formal unit in the hierarchy of lithostratigraphic units. In a stratified sequence of rocks it is distinguishable from layers above and below. A bed commonly ranges in thickness from a centimeter to a few meters.

BEDDING [stratig] - The arrangement of sedimentary rock in beds or layers of varying thickness and character.

BEDROCK - A general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material.

BOULDER - A detached rock mass larger than a cobble, having a diameter greater than 256 mm, being somewhat rounded or otherwise distinctly shaped by abrasion in the course of transport.

CALCAREOUS - Containing calcium carbonate.

CLAY [soil] - A rock or mineral particle in the soil having a diameter less than 0.002 mm (2 microns).

CLAY [geol] - A rock or mineral fragment or a detrital particle of any composition smaller than a fine silt grain, having a diameter less than 1/256 mm (4 microns).

COARSE-TEXTURED (light textured) SOIL - Sand or loamy sand.

CONE OF DEPRESSION - The depression of heads around a pumping well caused by the withdrawal of water.

CONFINED AQUIFER - An aquifer bounded above and below by impermeable beds, or by beds of distinctly lower permeability than that of the aquifer itself.

CONGLOMERATE - A coarse-grained sedimentary rock, composed of rounded pebbles, cobbles, and boulders, set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica, or hardened clay.

CONSOLIDATION - Any process whereby loosely aggregated, soft, or liquid earth materials become firm and coherent rock; specif. the solidification of a magma to form an igneous rock, or the lithification of loose sediments to form a sedimentary rock.

CONTAMINANT - As defined by Section 101(f)(33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

(a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,

(b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,

(c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal

Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),

(d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

(e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and

(f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CREEK - A term generally applied to any natural stream of water, normally larger than a brook but smaller than a river.

CRETACEOUS - The final period of the Mesozoic era. Thought to have covered the time span between 135 and 65 million years ago; also, the corresponding system of rocks.

CRITICAL HABITAT - The specific areas within the geographical area occupied by the species on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection.

DEPOSITS - Earth material of any type, either consolidated or unconsolidated, that has accumulated by some natural process or agent.

DIP - The angle that a stratum or any planar feature makes with the horizontal, measured perpendicular to strike and in the vertical plane.

DOLOMITE - A sedimentary rock consisting of calcium magnesium carbonate, $CaMg(CO_3)$. Occurs in beds formed by the alteration of limestone.

DRAINAGE CLASS (natural) - Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained - Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky,

or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained - Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well-drained - Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well-drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained - Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained - Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained - Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough periods during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained - Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

DRAINAGEWAY - A channel or course along which water moves in draining an area.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of the Class Insecta determined by the secretary to constitute a pest whose protection would present an overwhelming and overriding risk to man.

EROSION - The general process or the group of processes whereby the materials of the Earth's crust are loosened, dissolved, or worn away, and simultaneously moved from one place to another by natural agencies, but usually exclude mass wasting.

FINE-GRAINED - Said of a soil in which silt and/or clay predominate.

FINE-TEXTURED (heavy textured) SOIL - Sandy clay, silty clay, and clay.

FLOOD PLAIN - The surface or strip of relatively smooth land adjacent to a river channel, constructed by the present river in its existing regimen and covered with water when the river overflows its banks.

FORMATION - A body of rock strata that consists dominantly of a certain lithologic type or combination of types.

GLAUCONITIC SANDSTONE - greensand, composed of a green mineral, closely related to the micas and essentially a hydrous potassium iron silicate.

GRAVEL - An unconsolidated, natural accumulation of rounded rock fragments resulting from erosion, consisting predominantly of particles larger than sand, such as boulders, cobbles, pebbles, granules or any combination of these fragments.

GROUNDWATER - Refers to the subsurface water that occurs beneath the water table in soils and geologic formations that are fully saturated.

HARM - Hazard Assessment Rating Methodology - A system adopted and used by the United States Air Force to develop and maintain a priority listing of potentially contaminated sites on installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts. (Reference: DEQPPM 81-5, December 11, 1981.)

HAS - Hazard Assessment Score - The score developed by using the Hazard Assessment Rating Methodology (HARM).

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or

b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HERBICIDE - A weed killer.

IGNEOUS ROCKS - Rock or mineral that has solidified from molten or partially molten material, i.e. from magma.

INTERBEDDED - Beds lying between or alternating with others of different character; especially rock material laid down in sequence between other beds.

LIMESTONE - A sedimentary rock consisting of the mineral calcite (calcium carbonate, $CaCO_3$) with or without magnesium carbonate.

LITHOLOGY - 1. The description of rocks. 2. The physical character of a rock

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal proportions of sand, silt, and clay particles, and usually containing organic matter.

MEAN LAKE EVAPORATION - The total evaporation amount for a particular area; amount based on precipitation and climate (humidity).

METAMORPHIC ROCK - Any rock derived from pre-existing rocks by mineralogical, chemical, and/or structural changes, essentially in solid state, in response to marked changes in temperature, pressure, shearing stress, and chemical environment, generally at depth in the Earth's crust.

MIGRATION [Contaminant] - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

MINERAL - A naturally occurring inorganic element or compound having an orderly internal structure and characteristic chemical composition, crystal form and physical properties.

NET PRECIPITATION - Precipitation minus evaporation.

OUTCROP - That part of a geologic formation or structure that appears at the surface of the Earth; also, bedrock that is covered only by surficial deposits such as alluvium.

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment by the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure.

PLEISTOCENE - The first epoch of the Quaternary period; the Pleistocene began two to three million years ago and lasted until the start of the Holocene period some 8000 years ago.

POROSITY - The ratio of the aggregate volume of interstices in a rock or soil to its total volume.

POTENTIOMETRIC SURFACE - An imaginary surface representing the total head of groundwater and defined by the level to which water will rise in a well. The water table is a particular potentiometric surface.

QUARTZ - A crystalline silica, an important rock forming mineral: SiO_2. Occurs either in transparent hexagonal crystals (colorless or colored by impurities) or in crystalline. Forms the major proportion of most sands and has a widespread distribution in igneous, metamorphic and sedimentary rocks.

QUATERNARY - The second period of the Cenozoic era, following Tertiary; also, the corresponding system of rocks.

RECENT - An epoch of the Quaternary period which covers the span of time from the end of the Pleistocene epoch, approximately 8000 years ago, to the present. Also called the Holocene epoch.

RIVER - A general term for a natural freshwater surface stream of considerable volume and a permanent or seasonal flow, moving in a definite channel toward a sea, lake, or another river.

SAND - A rock or mineral particle in the soil, having a diameter in the range 0.52 - 2 mm.

SANDSTONE - A medium-grained fragmented sedimentary rock composed of abundant round or angular sand fragments set in a fine-grained matrix (silt

or clay) and more or less firmly united by a cementing material (commonly silica, iron oxide, or calcium carbonate).

SANDY LOAM - A soil containing 43 - 85% sand, 0 - 50% silt, and 0 - 20% clay, or containing at least 52% sand and no more than 20% clay and having the percentage of silt plus twice the percentage of clay exceeding 30% or containing 43 - 52% sand, less than 50% silt, and less than 7% clay.

SCHIST - A medium- or coarse-grained, strongly foliated, crystalline rock; formed by dynamic metamorphism.

SEDIMENTARY ROCK - A rock resulting from the consolidation of loose sediment that has accumulated in layers; e.g., a clastic rock (such as conglomerate or tillite) consisting of mechanically formed fragments of older rock transported from its source and deposited in water or from air or ice; or a chemical rock (such as rock salt or gypsum) formed by precipitation from solution; or an organic rock (such as certain limestones) consisting of the remains or secretions of plants and animals.

SHALE - A fine-grained detrital sedimentary rock, formed by the consolidation (especially by compression) of clay, silt, or mud.

SILT [soil] - (a) A rock or mineral particle in the soil, having a diameter in the range 0.002-0.005 mm; (b) A soil containing more than 80% silt-size particles, less than 12% clay, and less than 20% sand.

SILT LOAM - A soil containing 50 - 88% silt, 0 - 27% clay and 0 - 50% sand.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as the distance per unit time that water moves downward through the saturated soil.

Terms describing permeability are:

Very Slow	-	less than 0.06 inches per hour (less than 4.24×10^{-5} cm/sec)
Slow	-	0.06 to 0.20 inches per hour (4.24×10^{-5} to 1.41×10^{-4} cm/sec)
Moderately Slow	-	0.20 to 0.63 inches per hour (1.41×10^{-4} to 4.45×10^{-4} cm/sec)
Moderate	-	0.63 to 2.00 inches per hour (4.45×10^{-4} to 1.41×10^{-3} cm/sec)

Moderately Rapid - 2.00 to 6.00 inches per hour (1.41×10^{-3} to 4.24×10^{-3} cm/sec)

Rapid - 6.00 to 20.00 inches per hour (4.24×10^{-3} to 1.41×10^{-2} cm/sec)

Very Rapid - more than 20.00 inches per hour (more than 1.41×10^{-2} cm/sec)

(Reference: U.S.D.A. Soil Conservation Service)

SOLVENT - A substance, generally a liquid, capable of dissolving other substances.

STONE - A general term for rock that is used for construction, either crushed for use as aggregate or cut into shaped blocks as dimension stone.

STRATIGRAPHIC UNIT - A body of strata recognized as a unit for description, mapping, or correlation.

STRIKE - The direction taken by a structural surface, e.g., a bedding or fault plane, as it intersects the horizontal.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

TERRACE - Any long, narrow, relatively level or gently inclined surface, generally less broad than a plain, bounded along one edge by a steeper descending slope and along the other by a steeper ascending slope.

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and man-made features.

UNCONSOLIDATED - (a) Sediment that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth. (b) Soil material that is in a loosely aggregated form.

VALLEY - Any low-lying land bordered by higher ground, especially an elongate, relatively large, gently sloping depression of the earth's surface, commonly situated between two mountains or between ranges of hills and mountains, and often containing a stream or river with an outlet. It is usually developed by stream or river erosion, but can be formed by faulting.

WATER TABLE - The upper limit of the portion of the ground that is wholly saturated with water; the surface on which the fluid pressure in the pores of a porous medium is exactly atmospheric.

Appendix A

Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

1) Alabama Air National Guard
187th Tactical Fighter Group
Civil Engineering
P.O. Box 250284
Montgomery, Alabama 36125-0284
Captain Michelle Fuller
(205) 284-7302

2) Alabama Department of Environmental Management
1751 Dickinson Drive
Montgomery, Alabama
James McIndoe
(205) 242-6078

3) Alabama Natural Heritage Program
Alabama Department of Conservation and Natural Resources
State Lands Division
64 North Union Street
Montgomery, Alabama 36130
Mark A. Bailey
(205) 261-3007

4) City of Montgomery
Planning Controls Division
P.O. Box 1111
Montgomery, Alabama 36101-1111
Cindy Gates
(205) 241-2724

5) City of Montgomery
Planning, Programming and Transportation
P.O. Box 1111
Montgomery, Alabama 36101-1111
Kloeb Loflin
(205) 241-2712

6) DRMO - Montgomery
Building 900
Gunter AFB, Alabama 36114-5000
Patsy Cline
(205) 279-4194

OUTSIDE AGENCY CONTACT LIST (continued)

7) Federal Emergency Management Agency
Natural and Technological Hazards Division
1371 Peachtree Street NE
Suite 735
Atlanta, Georgia 30309
Don Hansford
(404) 853-4424

8) Industrial Development Board of the City of Montgomery
1325 Kershaw Street
P.O. Box 9111
Montgomery, Alabama 36108
Lois Kelly
(205) 265-1511

9) Publication Sales Office
Geological Survey of Alabama
P.O. Box O
Tuscaloosa, Alabama 35486-9780
(205) 349-2852 (Ext. 303)

10) United States Department of Agriculture
Soil Conservation Service
4510 South Court Street
Montgomery, Alabama 36105
David J. Barrow
(205) 832-7257

11) United States Fish and Wildlife Service
P.O. Drawer 1190
Daphne, Alabama 36526
Sandy Tucker
(205) 690-2181

12) United States Geological Survey
Water Resources Division
2721 Gunter Park Drive West
Montgomery, Alabama 36109
John C. Scott
(205) 223-7511

OUTSIDE AGENCY CONTACT LIST (continued)

13) Water Works and Sanitary Sewer
Board of the City of Montgomery
22 Bibb Street
P.O. Box 1631
Montgomery, Alabama 36102
Roy D. Holmberg
(205) 240-1626

Appendix B

USAF Hazard Assessment Rating Methodology

USAF HAZARD ASSESSMENT RATING METHODOLOGY

The DoD has developed a comprehensive program to identify, evaluate, and control hazardous waste disposal practices associated with past waste disposal techniques at DoD facilities. One of the actions required under this program is to:

> Develop and maintain a priority listing of contaminated installations and facilities for remedial action based on potential hazard to public health, welfare, and environmental impacts (Reference: DEQPPM 81-5, December 11, 1981).

Accordingly, the USAF has sought to establish a system to set priorities for taking further action at sites based upon information gathered during the PA phase of the IRP.

PURPOSE

The purpose of the site rating model is to assign a ranking to each site where there is suspected contamination from hazardous substances. This model will assist the ANG in setting priorities for follow-up site investigations.

This rating system is used only after it has been determined that (1) potential for contamination exists (hazardous waste present in sufficient quantity), and (2) potential for migration exists. A site may be deleted from ranking consideration on either basis.

DESCRIPTION OF THE MODEL

Like the other hazardous waste site ranking models, the USAF's site rating model uses a scoring system to rank sites for priority attention. However, in developing this model, the designers incorporated some special features to meet specific DoD needs.

The model uses data readily obtained during the Preliminary Assessment portion of the IRP. Scoring judgment and computations are easily made. In assessing the hazards at a given site, the model develops a score based on the most likely routes of contamination and worst hazards at the site. Sites are given low scores only if there are clearly no hazards. This approach meshes well with the policy for evaluating and setting restrictions on excess DoD properties.

Site scores are developed using the appropriate ranking factors presented in this appendix. The site rating form and the rating factor guidelines are provided at the end of this appendix.

As with the previous model, this model considers four aspects of the hazard posed by a specific site: (1) possible receptors of the contamination, (2) the waste and its characteristics, (3) the potential pathways for contaminant migration, and (4) any effort that was made to contain the waste resulting from a spill.

The receptors category rating is based on four rating factors: (1) the potential for human exposure to the site, (2) the potential for human ingestion of contaminants should underlying aquifers be polluted, (3) the current and anticipated use of the surrounding area, and (4) the potential for adverse effects upon important biological resources and fragile natural settings. The potential for human exposure is evaluated on the basis of the total population within 1000 feet of the site, and the distance between the site and the base boundary. The potential for human ingestion of contaminants is based on the distance between the site and the nearest well, the groundwater use of the uppermost aquifer, and population served by the groundwater supply within 3 miles of the site. The uses of the surrounding area are determined by the zoning within a 1-mile radius. Determination of whether or not critical environments exist within a 1-mile radius of the site predicts the potential for adverse effects from the site upon important biological resources and fragile natural settings. Each rating factor is numerically evaluated (0-3) and increased by a multiplier. The maximum possible score is also computed. The factor score and maximum possible scores are totaled, and the receptors subscore computed as follows: receptors subscore = (100 X factor subtotal/maximum score subtotal).

The waste characteristics category is scored in three steps. First, a point rating is assigned based on an assessment of the waste quantity and the hazard (worst case) associated with the site. The level of confidence in the information is also factored into the assessment. Next, the score is multiplied by a waste persistence factor, which acts to reduce the score if the waste is not very persistent. Finally, the score is further modified by the physical state of the waste. Liquid wastes receive the maximum score while scores for solids are reduced.

The pathways category rating is based on evidence of contaminant migration along one of three pathways: surface water migration, flooding, and groundwater migration. If evidence of contaminant migration exists, the category is given a subscore of 80 to 100 points. For indirect evidence, 80 points are assigned, and for direct evidence, 100 points are assigned. If no evidence is found, the highest score among the three possible routes is used. The three pathways are evaluated and the highest score among all four of the potential scores is used.

The scores for each of the three categories are added together and normalized to a maximum possible score of 100. Then the waste management practice category is scored. Scores for sites with no containment are not reduced. Scores for sites with limited containment can be reduced by 5 percent. If a site is contained and well-managed, its score can be reduced by 90 percent. The final site score is calculated by applying the waste management practices category factor to the sum of the score for the other three categories.

HAZARD ASSESSMENT RATING FORM

NAME OF SITE

LOCATION _____

DATE OF OPERATION OR OCCURRENCE _____

OWNER/OPERATOR _____

COMMENTS/DESCRIPTION _____

SITE RATED BY _____

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1000 ft. of site		4		12
B. Distance to nearest well		10		30
C. Land use-zoning within 1-mile radius		3		9
D. Distance to installation boundary		6		18
E. Critical environments within 1-mile radius of site		10		30
F. Water quality of nearest surface water body		6		18
G. Groundwater use of uppermost aquifer		9		27
H. Population served by surface water supply within 3 miles downstream of site		6		18
I. *Population served by groundwater supply within 3* miles of site		6		18
		Subtotals	_____	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal)

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) _____
2. Confidence level (C = confirmed, S = suspected) _____
3. Hazard rating (H = high, M = medium, L = low) _____

Factor Subscore A (from 20 to 100 based on factor score matrix)

B. Apply persistence factor
Factor subscore A x Persistence Factor = Subscore B

_____ x _____ = _____

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

_____ x _____ =

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists, then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water		8		24
Net precipitation		6		18
Surface erosion		8		24
Surface permeability		6		18
Rainfall intensity		8		24
		Subtotals	_____	108

Subscore (100 x factor score subtotal/maximum score subtotal)

2. Flooding		1		3

Subscore (100 x factor score/3)

3. Groundwater migration

Depth to groundwater		8		24
Net precipitation		6		18
Soil permeability		8		24
Subsurface flows		8		24
Direct access to groundwater		8		24
		Subtotals	_____	114

Subscore (100 x factor score subtotal/maximum score subtotal)

C. Highest pathway score

Enter the highest subscore value from A, B-1, B-2, or B-3 above

Pathways subscore

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors
Waste Characteristics
Pathways

Total _____ divided by 3 = _____

Gross Total Score

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

_____ x _____ = [ ]

I. RECEPTORS CATEGORY

Rating Factors	Rating Scale Levels 0	1	2	3	Multiplier
A. Population within 1,000 feet (includes on-base facilities)	0	1-25	26-100	Greater than 100	4
B. Distance to nearest water well	Greater than 3 miles	1 to 3 miles	3,001 feet to 1 mile	0 to 3,000 feet	10
C. Land use/zoning (within 1-mile radius)	Completely remote (zoning not applicable)	Agricultural	Commercial or Industrial	Residential	3
D. Distance to installation boundary	Greater than 2 miles	1 to 2 miles	1,001 feet to 1 mile	0 to 1,000 feet	6
E. Critical environments (within 1-mile radius)	Not a critical environment	Natural areas	Pristine natural areas; minor wetlands; preserved areas; presence of economically important natural resources susceptible to contamination	Major habitat of an endangered or threatened species; presence of recharge area; major wetlands	10
F. Water quality/use designation of nearest surface water body	Agricultural or industrial use	Recreation, propagation and management of fish and wildlife	Shellfish propagation and harvesting	Potable water supplies	6
G. Groundwater use of uppermost aquifer	Not used, other sources readily available	Commercial industrial, or irrigation, very limited other water sources	Drinking water, municipal water available	Drinking water, no municipal water available, commercial, industrial, or irrigation; no other water source available	9
H. Population served by surface water supplies within 3 miles downstream of site	0	1-50	51-1,000	Greater than 1,000	6
I. Population served by aquifer supplies within 3 miles of site	0	1-50	51-1,000	Greater than 1,000	6

II. WASTE CHARACTERISTICS

A-1 *Hazardous Waste Quantity*

S = Small quantity (5 tons or 20 drums of liquid)
M = Moderate quantity (5 to 20 tons or 21 to 85 drums of liquid)
L = Large quantity (20 tons or 85 drums of liquid)

A-2 Confidence Level of Information

C = Confirmed confidence level (minimum criteria below)

- o Verbal reports from interviewer (at least 2) or written information from the records
- o Knowledge of types and quantities of wastes generated by shops and other areas on base

S = Suspected confidence level

- o No verbal reports or conflicting verbal reports and no written information from the records
- o Logic based on a knowledge of the types and quantities of hazardous wastes generated at the base, and a history of past waste disposal practices indicate that these wastes were disposed of at a site

A-3 Hazard Rating

Rating Factors	Rating Scale Levels			
	0	1	2	3
Toxicity	Sax's Level 0	Sax's Level 1	Sax's Level 2	Sax's Level 3
Ignitability	Flash point greater than 200°F	Flash point at 140°F to 200°F	Flash point at 80°F to 140°F	Flash point less than 80°F
Radioactivity	At or below background levels	1 to 3 times background levels	3 to 5 times background levels	Over 5 times background levels

Use the highest individual rating based on toxicity, ignitability, and radioactivity and determine the hazard rating.

Hazard Rating	Points
High (H)	3
Medium (M)	2
Low (L)	1

II. WASTE CHARACTERISTICS--Continued

Waste Characteristics Matrix

Point Rating	Hazardous Waste Quantity	Confidence Level of Information	Hazard Rating
100	L	C	H
	L	C	M
80	M	C	H
70	L	S	H
	S	C	H
60	M	C	M
	L	S	M
	L	C	L
50	M	S	H
	S	C	M
	S	S	H
	M	S	M
40	M	C	L
	L	S	L
	S	C	L
30	M	S	L
	S	S	M
20	S	S	L

Notes:
For a site with more than one hazardous waste, the waste quantities may be added using the following rules:

Confidence Level

- Confirmed confidence levels (C) can be added.
- Suspected confidence levels (S) can be added.
- Confirmed confidence levels cannot be added with suspected confidence levels.

Waste Hazard Rating

- Wastes with the same hazard rating can be added.
- Wastes with different hazard ratings can only be added in a downgrade mode, e.g., MCM + SCM = LCM if the total quantity is greater than 20 tons.

Example: Several wastes may be present at a site, each having an MCM designation (60 points). By adding the quantities of each waste, the designation may change to LCM (80 points). In this case, the correct point rating for the waste is 80.

B. Persistence Multiplier for Point Rating

Persistence Criteria	Multiply Point Rating From Part A by the Following
Metals, polycyclic compounds, and halogenated hydrocarbons	1.0
Substituted and other ring compounds	0.9
Straight chain hydrocarbons	0.8
Easily biodegradable compounds	0.4

C. Physical State Multiplier

Physical state	Multiply Point Total From Parts A and B by the Following
Liquid	1.0
Sludge	0.75
Solid	0.50

III. PATHWAYS CATEGORY

A. Evidence of Contamination

Direct evidence is obtained from laboratory analyses of hazardous contaminants present above natural background levels in surface water, groundwater, or air. Evidence should confirm that the source of contamination is the site being evaluated.

Indirect evidence might be from visual observation (i.e., leachate), vegetation stress, sludge deposits, presence of taste and odors in drinking water, or reported discharges that cannot be directly confirmed as resulting from the site, but the site is greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination

Rating Factors	0	1	2	3	Multiplier
Distance to nearest surface water (includes drainage ditches and storm sewers)	Greater than 1 mile	2,001 feet to a mile	501 feet to 2,000 feet	0 to 500 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Surface erosion	None	Slight	Moderate	Severe	8
Surface permeability	0% to 15% clay ($>10^{-2}$ cm/sec)	15% to 30% clay (10^{-2} to 10^{-4} cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	Greater than 50% clay ($>10^{-6}$ cm/sec)	6
Rainfall intensity based on 1-year, 24 hour rainfall (thunderstorms)	<1.0 inch 0-5 0	1.0 to 2.0 inches 6-35 30	2.1 to 3.0 inches 36-49 60	>3.0 inches >50 100	8

B-2 Potential for Flooding

Floodplain	Beyond 100-year floodplain	In 100-year floodplain	In 10-year floodplain	Floods annually	1

B-3 Potential for Groundwater Contamination

Depth to groundwater	Greater than 500 feet	50 to 500 feet	11 to 50 feet	0 to 10 feet	8
Net precipitation	Less than -10 inches	-10 to +5 inches	+5 to +20 inches	Greater than +20 inches	6
Soil permeability	Greater than 50% clay ($>10^{-6}$ cm/sec)	30% to 50% clay (10^{-4} to 10^{-6} cm/sec)	15% to 30% clay 10^{-2} to 10^{-4} cm/sec	0% to 15% clay ($<10^{-2}$ cm/sec)	8
Subsurface flows	Bottom of site greater than 5 feet above high groundwater level	Bottom of site occasionally submerged	Bottom of site frequently submerged	Bottom of site located below mean groundwater level	8
Direct access to groundwater (through faults, fractures, faulty well casings, subsidence, fissures, etc.)	No evidence of risk	Low risk	Moderate risk	High risk	8

IV. WASTE MANAGEMENT PRACTICES CATEGORY

A. This category adjusts the total risk as determined from the receptors, pathways, and waste characteristics categories for waste management practices and engineering controls designed to reduce this risk. The total risk is determined by first averaging the receptors, pathways, and waste characteristics subscores.

B. Waste Management Practices Factor

The following multipliers are then applied to the total risk points (from A):

Waste Management Practice	Multiplier
No containment	1.0
Limited containment	0.95
Fully contained and in full compliance	0.10

Guidelines for fully contained:

Landfills:

- o Clay cap or other impermeable cover
- o Leachate collection system
- o Liners in good condition
- o Adequate monitoring wells

Surface Impoundments:

- o Liners in good condition
- o Sound dikes and adequate freeboard
- o Adequate monitoring wells

Spills:

- o Quick spill cleanup action taken
- o Contaminated soil removed
- o Soil and/or water samples confirm total cleanup of the spill

Fire Protection Training Areas:

- o Concrete surface and berms
- o Oil/water separator for pretreatment of runoff
- o Effluent from oil/water separator to treatment plant

General Note: If data are not available or known to be complete the factor ratings under items I-A through I, III-B-1, or III-B-3, then leave blank for calculation of factor score and maximum possible score.

Appendix C

Site Hazard Assessment Rating Forms and Factor Rating Criteria

HAZARD ASSESSMENT RATING FORM

NAME OF SITE Perimeter Fence Line (Site No. 1)

LOCATION East, South, and West Boundaries of the Station

DATE OF OPERATION OR OCCURRENCE 1965 to 1980

OWNER/OPERATOR Montgomery Air National Guard Station

COMMENTS/DESCRIPTION Waste Disposal by U.S. Army Corps of Engineers

SITE RATED BY Science & Technology, Inc..

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1-mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1-mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifier	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18
Subtotals			141	180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 78

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor subscore A x Persistence Factor = Subscore B

50 x .8 = 40

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists, then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108

Subscore (100 x factor score subtotal/maximum score subtotal) 61

2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to groundwater	3	8	24	24
		Subtotals	76	114

Subscore (100 x factor score subtotal/maximum score subtotal) 67

C. Highest pathway score

Enter the highest subscore value from A, B-1, B-2, or B-3 above

Pathways subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	78
Waste Characteristics	40
Pathways	80
Total 198	divided by 3 = 66

Gross Total Score

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

66 x 1.0 = **66**

HAZARD ASSESSMENT RATING FORM

NAME OF SITE Old Access Road/Pipe Storage Yard (Site No. 2)

LOCATION Southeast Corner of Station

DATE OF OPERATION OR OCCURRENCE 1970 to 1975

OWNER/OPERATOR Montgomery Air National Guard Station

COMMENTS/DESCRIPTION Waste Disposal by U.S. Army Corps of Engineers

SITE RATED BY Science & Technology, Inc..

I. RECEPTORS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score
A. Population within 1000 ft. of site	3	4	12	12
B. Distance to nearest well	3	10	30	30
C. Land use-zoning within 1-mile radius	3	3	9	9
D. Distance to installation boundary	3	6	18	18
E. Critical environments within 1-mile radius of site	3	10	30	30
F. Water quality of nearest surface water body	1	6	6	18
G. Groundwater use of uppermost aquifer	2	9	18	27
H. Population served by surface water supply within 3 miles downstream of site	0	6	0	18
I. Population served by groundwater supply within 3 miles of site	3	6	18	18

Subtotals 141 180

Receptors subscore (100 x factor score subtotal/maximum score subtotal) 78

II. WASTE CHARACTERISTICS

A. Select the factor score based on the estimated quantity, the degree of hazard, and the confidence level of the information.

1. Waste quantity (S = small, M = medium, L = large) M
2. Confidence level (C = confirmed, S = suspected) S
3. Hazard rating (H = high, M = medium, L = low) H

Factor Subscore A (from 20 to 100 based on factor score matrix) 50

B. Apply persistence factor
Factor subscore A x Persistence Factor = Subscore B

50 x .8 = 40

C. Apply physical state multiplier
Subscore B x Physical State Multiplier = Waste Characteristics Subscore

40 x 1.0 = 40

III. PATHWAYS

Rating Factor	Factor Rating (0-3)	Multiplier	Factor Score	Maximum Possible Score

A. If there is evidence of migration of hazardous contaminants, assign maximum factor subscore of 100 points for direct evidence or 80 points for indirect evidence. If direct evidence exists, then proceed to C. If no evidence or indirect evidence exists, proceed to B.

Subscore 80

B. Rate the migration potential for 3 potential pathways: Surface water migration, flooding, and groundwater migration. Select the highest rating, and proceed to C.

1. Surface water migration

Distance to nearest surface water	3	8	24	24
Net precipitation	2	6	12	18
Surface erosion	1	8	8	24
Surface permeability	1	6	6	18
Rainfall intensity	2	8	16	24
		Subtotals	66	108

Subscore (100 x factor score subtotal/maximum score subtotal) 61

2. Flooding	0	1	0	3

Subscore (100 x factor score/3) 0

3. Groundwater migration

Depth to groundwater	3	8	24	24
Net precipitation	2	6	12	18
Soil permeability	1	8	8	24
Subsurface flows	1	8	8	24
Direct access to groundwater	0	8	0	24
		Subtotals	52	114

Subscore (100 x factor score subtotal/maximum score subtotal) 46

C. Highest pathway score

Enter the highest subscore value from A, B-1, B-2, or B-3 above

Pathways subscore 80

IV. WASTE MANAGEMENT PRACTICES

A. Average the three subscores for receptors, waste characteristics, and pathways.

Receptors	78
Waste Characteristics	40
Pathways	80
Total 198	divided by 3 = 66

Gross Total Score

B. Apply factor for waste containment from waste management practices.

Gross Total Score x Waste Management Practices Factor = Final Score

66 x 1.0 = **66**

Montgomery Air National Guard Station
Montgomery, Alabama

USAF Hazard Assessment Rating Methodology
Factor Rating Criteria

The following is an explanation of the HARM factor rating criteria for each of the two potential sites.

I. Receptors

A. Population Within 1000 feet of Site.

Site Nos. 1 and 2, Factor Rating 3.
There is an estimated nonresident population of approximately 500 persons within 1000 feet of both sites. For two days each month, the station population is 210 persons.

B. Distance to Nearest Water Well.

Site Nos. 1 and 2, Factor Rating 3.
The abandoned water well on the Station is located approximately 3 to 4 feet from Site No. 1 and 200 feet from Site No. 2.

C. Land Use-Zoning (within 1-mile radius).

Site Nos. 1 and 2, Factor Rating 3.
The area within a 1-mile radius of both sites is zoned commercial and residential.

D. Distance to Installation Boundary.

Site Nos. 1 and 2, Factor Rating 3.
Site No. 1 is coincident with the East and South Perimeter Fences and a portion of the West Perimeter Fence. Site No. 2 is located about 35 feet north of the South Perimeter Fence.

E. Critical Environments (within 1-mile radius).

Site Nos. 1 and 2, Factor Rating 3.
The entire station and the potential sites on it are positioned above a major recharge area for the Eutaw aquifer.

F. **Water Quality/Use Designation of Nearest Surface Water Body.**

Site Nos. 1 and 2, Factor Rating 1.
The Pineview Homes Ditch and West End Ditch are the nearest surface water body receptors of drainage from Site Nos. 1 and 2. Most of the drainage from both sites enters the Pineview Homes Ditch that flows into Catoma Creek. Drainage from the north portion of the East Perimeter Fence (Site No. 1) flows to the West End Ditch, which drains into the Alabama River. Catoma Creek and the portion of the Alabama River that receives flow from the West End Ditch are officially designated for management of fish and wildlife.

G. **Groundwater Use of Uppermost Aquifer.**

Site Nos. 1 and 2, Factor Rating 2.
The Quaternary Alluvium aquifer is used as a partial source of municipal drinking water in Montgomery.

H. **Population Served by Surface Water Supplies Within 3-miles Downstream of Site.**

Site Nos. 1 and 2, Factor Rating 0.
The local population is supplied with water from aquifers.

I. **Population Served by Aquifer Supplies Within 3-miles Downstream of Site.**

Site Nos. 1 and 2, Factor Rating 3.
As many as 200,000 persons within a 3-mile radius of each potential site are served by aquifer supplies.

II. Waste Characteristics

Site No. 1

A-1: Hazardous Waste Quantity - Factor Rating M (Moderate).
A moderate quantity, approximately 27 drums, of diesel fuel is estimated to have been disposed of at this site.

A-2: Confidence Level - Factor Rating S (Suspected).
This confidence level is based on one verbal report from a former U.S. Army Corps of Engineers employee who worked at the Station and an awareness of prior Station property use dating to World War II.

A-3: Hazard Rating - Factor Rating H (High).
A high hazard rating was assigned because of the high toxicity of the fuel disposed of at this site.

Site No. 2

A-1: Hazardous Waste Quantity - Factor Rating M (Moderate).
It is estimated that 2500 gallons of engine oil and hydraulic oil, possibly mixed with small quantities of diesel fuel and leaded MOGAS, were sprayed on the site over a five-year period.

A-2: Confidence Level - Factor Rating S (Suspected).
This confidence level is based on one verbal report from a former U.S. Army Corps of Engineer employee who worked at the Station and an awareness of prior Station property use dating to World War II.

A-3: Hazard Rating - Factor Rating H (High).
This site was given a high hazard rating because of the high toxicity of the materials sprayed throughout its area.

B. Persistence Multiplier for Point Rating.

Site Nos. 1 and 2 were assigned a persistence multiplier of 0.8, based on the presence of waste petroleum products such as engine oil, hydraulic oil, and fuels. These wastes correspond primarily to the HARM category of "Straight Chain Hydrocarbons."

C. Physical State Multiplier.

A physical state multiplier of 1.0 was applied to both sites because the substances released were liquids.

III. Pathways Category

A. Evidence of Contamination.

Site Nos. 1 and 2 were given a score of 80 (Indirect Evidence) because they are greatly suspected of being a source of contamination.

B-1 Potential for Surface Water Contamination.

- Distance to Nearest Surface Water: Factor Rating 3.
  Site Nos. 1 and 2 are located within 500 feet of drainage ditches and storm sewers.

- Net Precipitation: Factor Rating 2.
  The average annual net precipitation is 7.12 inches for both sites.

- Surface Erosion: Factor Rating 1.
  There is slight erosion of soil at Site Nos. 1 and 2.

- Surface Permeability: Factor Rating 1.
  The surface permeability at Site Nos. 1 and 2 is moderate (4.45×10^{-4} to 1.41×10^{-3} cm/sec).

- Rainfall Intensity Based on 1-year, 24-hour Rainfall: Factor Rating 2.
  The rainfall intensity in the Station area is approximately 2.75 inches.

B-2 Potential for Flooding.

Site Nos. 1 and 2, Factor Rating 0.
Both sites are located beyond the 100-year flood plain of local streams.

B-3 Potential for Groundwater Contamination.

- Depth to Groundwater: Factor Rating 3.
  The depth to groundwater at Site Nos. 1 and 2 is 6 to 10 feet.

- Net Precipitation: Factor Rating 2.
  See B-1.

- Soil Permeability: Factor Rating 1.
  At Site Nos. 1 and 2, the permeability is slow (4.25×10^{-5} to 1.41×10^{-4} cm/sec).

- Subsurface Flows: Factor Rating 1.
  It is likely that the bottoms of Site Nos. 1 and 2 are occasionally submerged.

- Direct Access to Groundwater

  - Site No. 1: Factor Rating 3.
    The well located near the West Perimeter Fence may provide direct access of contaminants to the groundwater.

  - Site No. 2: Factor Rating 0.
    There is no direct access to groundwater from this site.

IV. Waste Management Practices Factor

A multiplier of 1.0 is applied to Site Nos. 1 and 2 because neither has any form of containment.